United States Circuit Court of Appeals

FOR THE SIXTH CIRCUIT.

THE GORDON FORM LATHE COMPANY,
Plaintiff-Appellant and Cross-Appellee,

vs.

FORD MOTOR COMPANY,
Defendant-Appellee and Cross-Appellant.

EQUITY No. 4564.

APPEAL FROM
THE DISTRICT COURT OF THE UNITED STATES,
EASTERN DISTRICT OF MICHIGAN,
SOUTHERN DIVISION.

TRANSCRIPT OF RECORD.

VOLUME III.

Defendant's Record (Continued),
Appendix to Record and Appeal Papers.

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INDEX.

VOLUME I.

Trial Papers, Plaintiff's Record and Part of Defendant's Record.

Caption 1

Decree on Mandate 2

Report of Special Master 4

I. Nature of Invention and History of Litigation and of Defendant's Use of Machinery 5

II. Claims of Parties 9

III. Accounting Period, and Production of Shafts on Infringing Machines: Question of Notice 11

A. Beginning of Period 11

B. Production of Camshafts and End of Accounting Period 15

IV. Profits 17

A. Profits from Infringement 18

1. Standard of Comparison 18

a. Standard for Model A Shaft 21

(1) Pioch and Modified Walcott Machines 21

(2) Westinghouse Lathe 24

(3) Ford Cam Shaper 28

b. Standard for Tractor Shaft 34

c. Effect of Choice of Incorrect Standard ... 35

2. Savings from Use of Infringing Machines ... 36

a. Savings or Loss in Other Operations: Straightening 40

b. Savings in Cam-Roughing Operation 42

(1) Direct Labor Savings 42

(a) Speeds of Production on Model T Shaft 43
(b) Speeds of Production on Model A Shaft 44
(c) Speeds of Production on Tractor Shaft 46
(2) Other Savings: Overhead or Burden 47
(3) Offset of Loss from Scrapping Shapers 59
3. Apportionment of Profits..... 60
V. Damages: Reasonable Royalty..... 71
A. Conditions to Assessment of Reasonable Royalty 73
B. Amount of Royalty..... 74
VI. Questions of Clean Hands and of Increase of Recovery 81
A. Clean Hands 81
B. Increase of Recovery..... 84
VIII. Interest 93
Schedule A. Production of Camshafts on Infringing Machines 94
Schedule B. Proration of Production on Camshafts between Pioch and Walcott Machines, May 14, 1930 to March 15, 1931, inclusive..... 97
Schedule C. Comparative Costs on Cam-Roughing Operation with Walcott Lathes and Standards of Comparison 99
Clerk's Notice of the Filing of the Master's Report..... 101
Plaintiff's Objections to Master's Report..... 101
Exceptions of Defendant to the Report of the Special Master 103
Motion for Action Upon Master's Report and Objections Thereto 111
Affidavit of Todd L. Moise..... 111

Schedule I 115
Schedule II 115
Schedule III 115
Schedule IV 115
Notice of Motion for Action Upon Master's Report..... 117
Opinion of the Hon. Arthur J. Tuttle, District Judge, on the Objections to the Master's Report..... 118
Master's Order for Statement of Account, dated July 6, 1937 132
Exhibit A—Defendant's Statement of Account, filed September 27, 1937 138
Exhibit 7. Operation Sheet No. 1..... 151
Operation Sheet No. 2..... 152
Operation Sheet No. 3..... 153
Operation Sheet No. 4..... 154
Operation Sheet No. 5..... 155
Exhibit 10. Material Price Card No. 1..... 156
Material Price Card No. 2..... 157
Exhibit 11. Computation of Certain Items of Cost of Gordon Lathe Operation on Tractor Camshafts 158
Exhibit 12. Computation of Certain Costs Involved in Rough Grinding Operation on Tractor Camshafts by Landis 10 x 36 Grinders during Period July 1, 1925 to January 1, 1928..... 160
Exhibit B—Amendment to Defendant's Statement of Account, verified December 31, 1937..... 161
Ptf. Rec. Vol. III beginning line 18, page 29 of Typewritten Transcript (Mr. Spohn)..... 166
Master's Order for Statement of Account, dated October 29, 1937 169
Exhibit C—Defendant's Further Statement of Account, dated December 31, 1937..... 171
Ptf. Rec. Vol. III from page 34, line 26 to page 37, line 3 inclusive of Typewritten Transcript (Mr. Spohn).. 193

TRANSCRIPT OF TESTIMONY
(Designated by both Plaintiff and Defendant).

Appearances 195

PLAINTIFF'S RECORD.

FRED M. HOVIS (Defendant's Witness):
Cross Examination by Mr. Spohn..... 195
Cross Examination by Mr. Farley..... 208
Re-Cross Examination by Mr. Spohn..... 212
Re-Cross Examination by Mr. Farley..... 214
Re-Cross Examination by Mr. Spohn..... 216

HAROLD M. WOEHRLE (Defendant's Witness):
Cross Examination by Mr. Spohn..... 216
Re-Cross Examination by Mr. Spohn..... 220
Cross Examination by Mr. Spohn..... 227
Re-Direct Examination by Mr. Farley..... 239
Re-Cross Examination by Mr. Spohn..... 242
Re-Direct Examination by Mr. Farley..... 244

FRED M. HOVIS (Recalled):
Cross Examination by Mr. Spohn..... 244

HAROLD M. WOEHRLE (Recalled):
Cross Examination by Mr. Spohn..... 246
Cross Examination by Mr. Farley..... 249

NORMAN R. SCOVILL (Defendant's Witness):
Direct Examination by Mr. Farley..... 253
Cross Examination by Mr. Spohn..... 254

TODD L. MOISE (Plaintiff's Witness):
Direct Examination by Mr. Spohn..... 255
Cross Examination by Mr. Farley..... 258
Re-Direct Examination by Mr. Spohn..... 273
Re-Cross Examination by Mr. Farley..... 274

CHARLES GORDON (Plaintiff's Witness):
Direct Examination by Mr. Spohn..... 275
Cross Examination by Mr. Farley..... 280
Re-Direct Examination by Mr. Spohn..... 282
Cross Examination by Mr. Farley..... 283

LYLE E. BROUGHTON (Plaintiff's Witness):
Direct* Examination by Mr. Spohn..... 291

HOWARD JONES (Plaintiff's Witness):
Direct Examination by Mr. Spohn..... 296
Cross Examination by Mr. Farley..... 300
Re-Direct Examination by Mr. Spohn..... 302
Re-Cross Examination by Mr. Farley..... 303

MILES G. SLONIKER (Plaintiff's Witness):
Direct Examination by Mr. Spohn..... 304
Cross Examination by Mr. Farley..... 308

DEFENDANT'S RECORD.

CHARLES GORDON (Plaintiff's Witness):
Cross Examination by Mr. Farley..... 312

TODD L. MOISE (Recalled) (Plaintiff's Witness):
Cross Examination by Mr. Farley..... 423

---

* The Examination of Lyle E. Broughton by Mr. Spohn, appearing on page 291, was incorrectly stated in the Typewritten Transcript. It should be "Direct" instead of "Cross."

VOLUME II.

Defendant's Record (Continued).

MORRIS E. SHAWKEY (Defendant's Witness):
Direct Examination by Mr. Farley..... 427

SPENCER W. LIBBY (Defendant's Witness):
Direct Examination by Mr. Farley..... 436
Cross Examination by Mr. Spohn..... 444
Re-Direct Examination by Mr. Farley..... 454
Re-Cross Examination by Mr. Spohn..... 457

MORRIS E. SHAWKEY (Recalled) (Defendant's Witness):
Direct Examination by Mr. Farley..... 461

MIKE KLOPSIC (Defendant's Witness):
Direct Examination by Mr. Farley..... 464

RALPH T. MYERS (Defendant's Witness):
Direct Examination by Mr. Farley..... 481

VICTOR F. MARENTETTE (Defendant's Witness):
Direct Examination by Mr. Farley..... 486
Cross Examination by Mr. Spohn..... 493

A. M. WIBEL (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 495

CHARLES GORDON (Plaintiff's Witness):
Cross Examination by Mr. Farley..... 511

THEODORE R. DAHL (Defendant's Witness):
Direct Examination by Mr. Farley..... 512

GEORGE W. SMITH, JR. (Defendant's Witness):
Direct Examination by Mr. Farley..... 526

ALBERT APTEKAR (Defendant's Witness):
Direct Examination by Mr. Farley..... 529
Cross Examination by Mr. Michael..... 545
Re-Direct Examination by Mr. Farley..... 559

WILLIAM D. HUNT (Defendant's Witness):
Direct Examination by Mr. Farley..... 559
Cross Examination by Mr. Spohn..... 564
Re-Direct Examination by Mr. Farley..... 567
Re-Cross Examination by Mr. Spohn..... 567
Re-Direct Examination by Mr. Farley..... 567

HENRY G. PILLINGER (Defendant's Witness):
Direct Examination by Mr. Farley..... 568
Cross Examination by Mr. Spohn..... 579
Re-Direct Examination by Mr. Farley..... 585
Re-Cross Examination by Mr. Spohn..... 586

JOHN L. SCHMIDT (Defendant's Witness):
Direct Examination by Mr. Farley..... 588
Cross Examination by Mr. Spohn..... 605

RUDY EHRHARD HERKLOTZ (Defendant's Witness):
Direct Examination by Mr. Farley..... 606

WILLIAM F. PIOCH (Defendant's Witness):
Direct Examination by Mr. Farley..... 632
Cross Examination by Mr. Michael..... 663
Re-Direct Examination by Mr. Farley..... 697
Re-Cross Examination by Mr. Michael..... 722
Re-Direct Examination by Mr. Farley..... 727

NIELS BOESEN (Defendant's Witness):
Direct Examination by Mr. Farley..... 728

ALANSON P. BRUSH (Defendant's Witness):
Direct Examination by Mr. Farley..... 752
Cross Examination by Mr. Michael..... 801
Re-Direct Examination by Mr. Farley..... 813
Re-Cross Examination by Mr. Michael..... 820

ERVIN FRANKLIN (Defendant's Witness):
Direct Examination by Mr. Farley 825
Cross Examination by Mr. Spohn 843
Re-Direct Examination by Mr. Farley 846
Re-Cross Examination by Mr. Spohn 846
Re-Direct Examination by Mr. Farley 846
Re-Cross Examination by Mr. Spohn 847

JOSEPH HENRY ACHTEN (Defendant's Witness):
Direct Examination by Mr. Farley 847
Cross Examination by Mr. Michael 856
Re-Direct Examination by Mr. Farley 859

FRED HOVIS (Recalled) (Defendant's Witness):
Re-Direct Examination by Mr. Farley 863
Re-Cross Examination by Mr. Spohn 869
Re-Direct Examination by Mr. Farley 874
Re-Cross Examination by Mr. Spohn 877
Re-Direct Examination by Mr. Farley 881
Re-Cross Examination by Mr. Spohn 882

VOLUME III.

Defendant's Record (Continued),
Appendix to Record and Appeal Papers.

HAROLD W. HOGELAN (Defendant's Witness):
Direct Examination by Mr. Farley..... 883
Re-Direct Examination by Mr. Farley..... 889

PIERCE ALBERT WEYL (Defendant's Witness):
Direct Examination by Mr. Farley..... 891
Cross Examination by Mr. Michael..... 911
Re-Direct Examination by Mr. Farley..... 913
Re-Cross Examination by Mr. Michael..... 918
Re-Direct Examination by Mr. Farley..... 920
Re-Cross Examination by Mr. Michael..... 924

JAMES McEVOY (Defendant's Witness):
Direct Examination by Mr. Farley..... 925
Cross Examination by Mr. Michael..... 932
Re-Direct Examination by Mr. Farley..... 935

ALBERT APTEKAR (Recalled) (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 936
Re-Cross Examination by Mr. Spohn..... 939
Re-Cross Examination by Mr. Michael..... 940
Re-Direct Examination by Mr. Farley..... 942
Re-Cross Examination by Mr. Michael..... 943
Re-Direct Examination by Mr. Farley..... 945

I. JOSEPH FARLEY (Defendant's Witness):
Direct Testimony 951
Cross Examination by Mr. Michael..... 956

JOHN W. MICHAEL (Plaintiff's Witness):
Direct Testimony 962
Cross Examination by Mr. Farley..... 965

NORMAN R. SCOVILL (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 971

HAROLD M. WOEHRLE (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 980

WILLIAM F. PIOCH (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 1051
Re-Cross Examination by Mr. Michael..... 1055
Re-Direct Examination by Mr. Farley..... 1059
Re-Direct Examination by Mr. Farley..... 1060
Re-Cross Examination by Mr. Michael..... 1061
Re-Direct Examination by Mr. Farley..... 1063
Re-Cross Examination by Mr. Michael..... 1063
Re-Direct Examination by Mr. Farley..... 1063
Re-Cross Examination by Mr. Michael..... 1064
Re-Direct Examination by Mr. Farley..... 1064
Re-Cross Examination by Mr. Michael..... 1065

HAROLD M. WOEHRLE (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 1065
Re-Cross Examination by Mr. Spohn..... 1071
Re-Direct Examination by Mr. Farley..... 1080

DONALD M. RUSSELL (Defendant's Witness):
Direct Examination by Mr. Farley..... 1082

HAROLD M. WOEHRLE (Defendant's Witness):
Examination by the Master..... 1094
Re-Direct Examination by Mr. Farley..... 1095
Re-Cross Examination by Mr. Spohn..... 1096

ALEXANDER OBERHOFFKEN (Defendant's Witness):
Direct Examination by Mr. Farley..... 1097
Cross Examination by Mr. Michael..... 1114
Re-Direct Examination by Mr. Farley..... 1122
Re-Cross Examination by Mr. Michael..... 1124
Re-Direct Examination by Mr. Farley..... 1126
Re-Cross Examination by Mr. Michael..... 1127
Re-Direct Examination by Mr. Farley..... 1129

HENNING OHRN (Defendant's Witness):
Direct Examination by Mr. Farley..... 1130
Cross Examination by Mr. Michael..... 1137
Re-Direct Examination by Mr. Farley..... 1150

CHARLES HAJOVICH (Defendant's Witness):
Direct Examination by Mr. Farley..... 1151
Cross Examination by Mr. Michael..... 1159

ALBERT KIPTA (Defendant's Witness):
Direct Examination by Mr. Farley..... 1165
Cross Examination by Mr. Michael..... 1167

WILLIAM D. HUNT (Recalled) (Defendant's Witness):
Re-Direct Examination by Mr. Farley..... 1171
Re-Cross Examination by Mr. Michael..... 1174
Re-Direct Examination by Mr. Farley..... 1182

CHARLES GORDON (Recalled) (Plaintiff's Witness):
Re-Direct Examination by Mr. Michael..... 1183
Re-Cross Examination by Mr. Farley..... 1198

TODD L. MOISE (Recalled) (Plaintiff's Witness):
Re-Direct Examination by Mr. Spohn..... 1210
Re-Cross Examination by Mr. Farley..... 1240
Re-Direct Examination by Mr. Spohn..... 1258

APPENDIX

TO TRANSCRIPT OF RECORD

Designated Portion of the Testimony of the Witnesses Otto H. Schultz, Frank Steinke, Bert Weisel, William Cunningham, and Charles Gordon from Plaintiff's Exhibit 14—Patent Office Record, Interference No. 47,200—Herman W. Melling vs. Charles Gordon and Alfred Redlin.

OTTO H. SCHULTZ:

Q. 1, page 132, to and including Q. 22 and Answer, page 136:

Direct Examination by Mr. Earl..... 1261

Q. 45, page 140, to and including Q. 72 and Answer 145:

Direct Examination by Mr. Earl..... 1264

BERT WEISEL:

Q. 1, page 190, to and including Q. 55 and Answer, page 198:

Direct Examination by Mr. Earl..... 1268

XQ. 84 and Answer, page 203:

Cross Examination by Mr. Dennett..... 1274

XQ. 100, page 205, to and including XQ. 102 and Answer, page 206:

Cross Examination by Mr. Dennett..... 1274

XQs. 115 and 116 and Answers, page 210:

Cross Examination by Mr. Dennett..... 1275

XQ. 121, page 211, to and including RDQ. 150 and Answer, page 219:

Cross Examination by Mr. Dennett..... 1276

Re-Direct Examination by Mr. Earl..... 1281

RDQs. 153 and 154 and Answers, page 220:

Re-Direct Examination by Mr. Earl..... 1282

RDQ. 166, page 222, to and including RDQ. 177 and Answer, page 224:

Re-Direct Examination by Mr. Earl..... 1282

RDQ. 183, page 224 to and including RXQ. 193 and Answer, page 226:

Re-Direct Examination by Mr. Earl..... 1284

Re-Cross Examination by Mr. Dennett..... 1284

RRDQ. 207 and Answer, page 229:

Re-Re-Direct Examination by Mr. Earl..... 1285

FRANK STEINKE:

Q. 1, page 230, to and including RDQ. 66 and Answer, page 238:

Direct Examination by Mr. Earl..... 1286

Cross Examination by Mr. Dennett..... 1289

Re-Direct Examination by Mr. Earl..... 1291

WILLIAM CUNNINGHAM:

Q. 1, page 288, to and including Q. 16 and Answer, page 293:

Direct Examination by Mr. Earl..... 1292

XQ. 19, page 293, to and including XQ. 43 and Answer, page 298:

Cross Examination by Mr. Dennett..... 1295

RDQ. 44 and Answer, page 299:

Re-Direct Examination by Mr. Earl..... 1299

CHARLES GORDON:

Q. 56, page 402, to and including Q. 57 and Answer, page 403:

Direct Examination by Mr. Dennett..... 1300

Q. 66, page 405, to and including Q. 74 and Answer, page 409:

Direct Examination by Mr. Dennett..... 1300

XQ. 188, page 441, to and including XQ. 190 and Answer, page 442:

Cross Examination by Mr. Earl..... 1303

Master's Report in *National Tube Company v. Mark et al.*, Equity No. 4360 1305

Proceedings in Court 1305

Proceedings Before the Master 1306

Conceded Facts 1307

The 1909 Order 1308

Answers to Questions Referred 1309

Gains and Profits 1310

Savings 1312

Advantages Derived by Defendant From and Through Said Infringement 1315

License 1319

Special Damages 1321

Damages 1322

Interest on the Award 1325

Judge Sater's Opinion on Exceptions to Master's Report in *National Tube Company v. Mark et al.*, Equity No. 4360 1326

Special Master's Report, on Accounting of Profits, Opinion and Order, and Opinion and Order on Standard of Comparison in *O'Neal v. San Jose Canning Co.*, Equity No. 1307 1333

Special Master's Report on Accounting of Profits 1333

Master's Opinion and Order 1336

Special Master's Opinion and Order on Standard of Comparison 1340

Opinion of the Circuit Court of Appeals for the Sixth Circuit in *Gordon Form Lathe Co. v. Walcott Machine Co.*, No. 5511, Decided April 12, 1929, 32 Fed. (2d) 55 1344

Opinion of the Circuit Court of Appeals for the Sixth Circuit in *Gordon Form Lathe Co. v. Ford Motor Co.*, Nos. 7363, 7364, Decided January 12, 1937, 87 Fed. (2d) 390 1358

Final Judgment 1365

Notice of Appeal of Plaintiff..... 1369

Bond on Appeal of Plaintiff..... 1370

Plaintiff's Statement of Points To Be Urged on Appeal.... 1371

Notice of Appeal of Defendant..... 1373

Bond on Appeal of Defendant..... 1375

Defendant's Statement of Points To Be Relied On Upon Appeal under Rule 75(d) of Rules of Civil Procedure... 1376

Stipulation Re Waiver of Supersedeas Bond..... 1379

Stipulation Concerning Number of Copies of Record to be Filed on Appeal..... 1379

Stipulation Re Exhibits and Transcript of Record on Appeal in *Gordon v. Ford,* Nos. 7363-4..... 1380

Order Re Exhibits and Transcript of Record on Appeal in *Gordon v. Ford,* Nos. 7363-4..... 1381

Stipulated Designation of Contents of Plaintiff-Defendant Composite Record on Appeal..... 1382

Stipulation Extending Time to July 29, 1941..... 1399

Order Extending Time to July 29, 1941..... 1399

Stipulation (filed July 21, 1941) Extending Time to September 27, 1941, and Approval of U. S. Circuit Court of Appeals 1400

Stipulation (filed September 24, 1941) Extending Time to October 27, 1941..... 1401

Stipulation Extending Time to November 26, 1941, and Approval of U. S. Circuit Court of Appeals..... 1402

Certificate of Clerk..... 1403

VOLUME IV.

Plaintiff's Exhibits, Defendant's Exhibits and Main Record Exhibits.

PLAINTIFF'S EXHIBITS.

Exhibit		Page
D.	Cost Summary Card for A-6250 Camshaft covering January and March 1930 and September and October 1929	1404-5
E.	Cost Summary Card for A-6250 Camshaft covering May, August and October 1930 and March 1931	1406-7
E-1.	Cost Summary Card for A-6250 Camshaft covering March, May and July 1929. (Same as Exhibit 6 in Exhibit A)	1408-9
F.	Cost Summary Card for T-410 Camshaft covering January to June 1923	1410
F-1.	Cost Summary Card for T-410 Camshaft covering July to November 1923	1411
F-2.	Cost Summary Card for T-410 Camshaft covering January to June 1924	1412
F-3.	Cost Summary Card for T-410 Camshaft covering July to November 1924	1413
F-4.	Cost Summary Card for T-410 Camshaft covering April to September 1925	1414
F-5.	Cost Summary Card for T-410 Camshaft covering October to November 1925	1415
F-6.	Cost Summary Card for T-410 Camshaft covering January 1926 to October 1929	1416-17
F-7.	Cost Summary Card for T-410 Camshaft covering November 1928	1418
F-8.	Cost Summary Card for T-410 Camshaft covering October 1930	1419
F-9.	Cost Summary Card for A-6250 Camshaft covering August 1928 to January 1929	1420-21

EXHIBIT PAGE

F-10. Cost Summary Card for A-6250 Camshaft covering December 1927 to June 1928.....1422-23

F-11. Cost Summary Card for F-446 Camshaft covering April to September 1925..... 1424

F-12. Cost Summary Card for F-446 Camshaft covering October to November 1925..... 1425

F-13. Cost Summary Card for F-446 Camshaft covering January 1926 to March 1928.....1426-27

H-1. Production Cost Record for T-410 Camshaft covering November 1927..... 1428

L-1 to L-3. Pages from note book kept by witness Spencer W. Libby 1429-31

M. Operation Sheet compiled from notations appearing in Exhibit L. (Same as Exhibit 13 attached to Exhibit C) 1432-33

N. Operation Sheet for T-410 Camshaft dated 10-8-24. (Same as Exhibit 14 attached to Exhibit C).....1434-35

O. Correspondence between Ford Motor Company and Jackson Shaper Company.....1436-63

P-1 to P-14. Ford Work Orders for Repairs to Melling Lathes 1464-70

Q. Inventory card covering Ford Camshaft Shaper #10706 1471

R. Inventory card covering Ford Camshaft Shaper #11628 1472

S. Inventory card covering Ford Camshaft Shaper #12205 1473

W-1 to W-14. Study of operation of Melling Lathes....1474-87

X-1. Productive Labor and Overhead for Department 410 6-1-25 1488

X-2. Same—continued to 2-28-31 1489

X-3. Productive Labor and Overhead for F-446 Camshaft Machining 6-1-25 to 3-31-28 1490

EXHIBIT PAGE

Y-1. Inventory Card covering Melling Cam Turning Lathe Ford #36592 1491-92

Z-3. Plaintiff's statement of account.....1493-1513

Z-4. Plaintiff's schedule showing computation of depreciation on Model T type cam shapers and Melling Cam Lathes 1514-16

Z-5. Plaintiff's compilation of depreciation cost on Model T Cam Shapers and Melling Cam Lathes.....1517-18

Z-6. Plaintiff's computation of Maintenance and Overhaul Expense 1519-22

Z-7. Plaintiff's computation of Cost of Tools.....1523-24

CC. Telegram dated 11-18-30 addressed to Ford Motor Company 1525

DD. Telegram dated 11-18-30 1526

GG. Release to White Motor Company from infringement of Gordon patent. (Included in Exhibit RR). 1540

HH. Letter of White Motor Company to Mr. John W. Michael dated 12-24-29. (Included in Exhibit RR). 1532

RR. Gordon Form Lathe Company agreement file.....1527-57

DEFENDANT'S EXHIBITS.

209. Copy of U. S. Patent No. 1,655,655 of January 10, 1928 to Herman W. Melling.....1558-66

217 to 222. Ford Purchase Orders for Melling Cam Turning Lathes 1567-73

232. White Motor Company Departmental Correspondence dated 12-17-31..... 1574

233. Same—dated 1-29-30 1575

254. Ford Motor Company print dated 11-17-13 showing front view of construction of original Ford Cam Shaper with attachment superimposed in yellow.... 1576

255. Same—end view 1577

Exhibit		Page
257.	Ford assembly print showing attachment for use in shaping Model A Camshafts	1578
258.	Same—sub-assembly	1579
259.	Same—showing removal of tools numbers 1 and 5	1580
263.	Sketch drawn by witness Pioch	1581
264.	Letter of Mr. Pioch to Mr. Farley dated 11-2-38	1582
266.	Computation by witness Pioch	1583
268.	Print Camshaft Shaping Machine Oberhoffken design—layout showing "tools to cut in both directions—speeds being equal"	1584
269.	Same—Layout to show individual relief of tools on return stroke	1585
272.	Sketch by witness Brush showing cutting action of Shaper Tool	1586
273.	Same—showing cutting action of Melling Tool	1587
276.	Brush sketch of two way cuts	1588
281.	Operation Sheet for T-410 Camshaft dated 12-21-27. (Same as Exhibit 15 in Exhibit C)	1589-90
289 (1 to 10).	Engineering Record of T-410 Camshaft, Forging Size	1591-95
290 (1 to 13).	Same—Finished Size	1596-1602
291 (1 to 3).	Engineering Record for A-6250 Camshaft, Forging Size	1602-03
292 (1 to 4).	Same—Finished Size	1604-05
293.	Ford print 9-Z-32, Shaper Tool	1606
294.	Ford print 9-Z-215, Melling Tool	1607
295.	Letter of witness Pioch dated 2-1-39 re: Surface Speeds of Shaper Tools	1608-09
296.	Sample Ford Purchase Order	1610
297.	Print of Ford Camshaft A-6250-A1	1611

EXHIBIT PAGE

298 (1 to 6). Engineering Record Fordson Tractor Camshaft, Forging and Finished Size.....1612-14

299. Summary of Ford Tractor Production..... 1615

301. Defendant's substitute pages for plaintiff's statement of account Exhibit Z-3 making 3 changes....1616-22

302. Same—6 changes 1623-29

304. Pages from Ford Parts Price List, effective 2-1-31 1630-33

305. Defendant's computation of Comparative Direct Labor Costs on F-446 Tractor Camshafts.....1634-35

306. International Harvester Company Requisition for Gordon Lathe dated 11-20-19..... 1636

307. International Harvester Company order for Gordon Lathe dated 11-24-19 1637

308. International Harvester Company installation of machinery card covering "Gordon Std. Cam Turning Machine" 1638

309. International Harvester Company disposition of machinery card covering same 1639

312. Copy U. S. Patent No. 1,512,995 of 10-28-24 to Herman W. Melling 1640-47

313. Copy U. S. Patent No. 1,634,550 of 7-5-27 to Herman W. Melling 1648-52

314. Print #C-2129 of Walcott Machine Company—"Assembly of New Style Parallel Type Tool Head" 1653

315. Print #KT-530-A of Walcott Machine Company—"Assembly of Tool Head" 1654

MAIN RECORD EXHIBITS.

Exhibit		Page
2.	Copy of U. S. Patent No. 1,542,803 of 6-16-25 to Chas. Gordon *et al.*	1655-69
5.	Amended Final Decree in Walcott case	1670-72
40.	Notice of Infringement dated 7-1-25	1673
41.	Cuts only of Walcott Machine Company advertising pamphlet	1674-75
42.	Mailing List	1676-83
48.	1929 Notice of Infringement	1684-86
52.	Photograph of Ford Shaper ¾ front view	1687
53.	Same—front view	1688
53-b.	Illustrated chart of Ford Shaper tool movements and actions	1689
55.	Record re: delivery of Gordon machine to Ford	1690
56.	Copy of Ford order for Gordon machine	1691-92
61.	Affidavit of I. W. Kindall re: Ford Camshaft Shaper	1693
62.	Ford Motor Company Print dated 5-18-15 showing Ford Camshaft Shaper, front view	1694
63.	Same—end view	1695
64.	Walcott letter to Ford 7-30-29	1696
71.	Copy of General Motors-Gordon Company Agreement. (Included in Exhibit RR)	1552-57
154-a, b, c, d.	Records produced by Ford in response to Court order	1697-1700

(1667) HAROLD W. HOGELAN was thereupon called as a witness on behalf of the defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. Where do you live, Mr. Hogelan? A. 2647 Alter Road, Detroit.

Q. And, what is your occupation? A. I have charge of the cost department.

Q. Of what company? A. Hudson Motor Car Company.

Q. What is the system used at Hudson Motor Car Company for determining costs, and let us, in view of the fact the proceedings here have to do with the production of cam shafts, I wonder if you could tell the Court—you are familiar with what a cam shaft is? A. Yes, sir.

Q. I wonder if you could tell the Court just how you would go about in the Hudson Company establishing cost on this particular piece, or a piece similar to the one I am now showing you, which is a finished cam shaft for the Ford model B car, and which is marked Defendant's Exhibit 33. A. You mean as a cost department head what I would determine?

Q. Just what your particular system is at the Hudson Company at the present time, and what it has been through the years, insofar as establishing costs? A. The time study department would give me a time study card, with a complete cost of machining a cam shaft.

Q. Now, do you keep in your department separate costs on all of the parts that go into the car? **(1668)** A. No, sir.

Q. How do you, at Hudson's, determine your figure of cost? A. We figure our cost on the basis of an automobile; complete automobile.

Q. And, do you keep from month to month the cost of the separate parts, such as cam shafts? A. Unless the time study price changed, we wouldn't change the cost of the car.

Q. Now, suppose you were asked right now as to the cost in, let's say, the month of December, 1927, we will say, of a cam shaft, or producing a cam shaft at the Hudson Motor Car Company; would you have any records avail-

able, or would records have been available for you to find out what that cost was?

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(1670) A. Yes, sir. We would have a cost of that cam shaft in 1939, as what it cost us in 1927 for service price only.

Q. For service price only? A. That is right.

Q. Now, what type of records, or what is your system at the Hudson Company for establishing costs in your department? A. Well, we know what we pay for the material. We have a purchase order and a cost card for the material. The time study department sends us down a complete machining cost, not by operation, but a complete cost of machining. We know what our overhead **(1671)** is in that department, and that compiled together makes our cost.

Q. Now, do you have any check, or do you establish your cost in the department merely from a time study card, or do you get actual production figures at the end of the month, or the end of the day from the department and the actual amount of hours of labor that were spent in the department? A. We get a production report at the end of each week for the number of motors built for that week. And, every motor has a cam shaft in, so we knew we built so many cam shafts, or we built so many motors.

Q. You get a report, then, from the whole department, which makes the motors, is that the idea? A. That is right.

Q. And they give you a record of just how many motors were made? A. That is right.

Q. Do you get any individual records as to all of the various parts that went into the motor; the cam shaft, the crankshaft, the valves? A. No, sir.

Q. Do you keep any separate record of that cost at any time of all of these various parts? A. Only at the start of the season when we come into production for a new part, we work up a part to set our service prices with, and in case of a supplier offering to bill a certain part for less than we make in our plant, we will make a cost to see whether we can make it cheaper than we can buy it. Other than that, we do not.

Q. Now, on the proposition of the service cost, or service sales, **(1672)** you say you would get the price of a cam shaft from your service sales department, as I understood it, at the present day, if you wanted to find the cost of a cam shaft in 1927. Was that your testimony, did I understand correctly? A. Will you repeat it?

(The last question was thereupon repeated by the reporter.)

A. No, if we built the cam shaft in 1927, and it was laying in our service stock, we would have a cost in our department of a cam shaft.

Q. Now, would that be the cost of producing it, or the cost at which the article is set, the sales price, the price at which you sell it? A. Yes, sir.

Q. It would be the sales price, the price at which you sell it? A. It would be the cost; what it cost us to make it.

Q. I see. And, that is the cost which you established, as I understood your testimony, then, at the very beginning of the production of the model? A. Yes, sir.

Q. And that price or cost is established by a time study; is that the idea? A. Furnished to us—from a production time sheet furnished to us by the time study department; as we transfer that stock from production over to service at the start of the year, so that we have them in stock for replacement.

Q. Now, that time study furnished to you, as I understood your testimony, would give, however, the lump sum cost of the complete cam shaft? **(1673)** A. Yes, sir.

Q. Now, do you have at any time available to you any data or written record that would give the cost of a number of operations? Assuming, just for the sake of this question, that it took, we will say, 65 or 70 separate and distinct operations to produce this particular cam shaft, Exhibit 33, do you have in your cost accounting system any way of determining the cost of each one of those separate operations? A. No, sir.

Q. Have you ever kept any records of that type? A. No, sir.

Q. Would you as a—I understand you are in charge of the cost accounting at the Hudson Company? A. Yes, sir.

Q. Would you recommend to the company that they keep such a record? A. I would recommend that they do not keep such a record.

Q. Why would you recommend that they do not keep such a record? A. Because there is no use for it in the cost of building an automobile.

Q. How long have you been engaged in this cost accounting work, Mr. Hogelan? How long have you been with the Hudson Company? A. Well, I have been with the Hudson Motor Car Company 14 years.

Q. 14 years. And, doing cost accounting? A. Yes, sir.

Q. Have you ever had an occasion in that 14 years to determine the exact cost of a single operation of a part such as this which is made by the use of 60 different operations (indicating)? A. No, sir.

* * * * *

(1675) Q. Now, with respect to these time studies that you get from the **(1676)** department, how long do you preserve those actual physical time study cards? A. We keep them until the part becomes obsolete.

Q. And, when does the part become obsolete? A. When it is not used in the preceding model that is coming out.

Q. That is, if you had a cam shaft such as this one—we will assume for the sake of the question that this would be an "A," what would be designated as A-6250 cam shaft for the Ford Model A; now, in your system, as soon as you change the model, and change that particular part, you would, then, throw away all your time studies, is that the idea? A. Yes, sir.

Q. At the Ford Motor Company, Mr. Hogelan, they use a Form of the type shown in Exhibit H (indicating), and, one of these Forms are used for each separate part that goes into the car, that is produced by the Ford Company. This Form, as you note, gives the part number, the name of the part,—and, showing the way the Form is filled out, I show you Exhibit H-1, which is a similar form, but of an earlier date than Exhibit H, and that gives the part number. It would be T-410, and the name cam shaft, and the date, and the department, whatever designation the

department has. Now, you notice it gives the dates of the month, running 31 days and the shifts, and the hours, the shift production, the total production, and the total hours, and various other information; minute costs, number of pieces of scrap, and all that sort of thing. Do you use a record of that type at Hudson Company? **(1677)** A. No, sir. That seems rather complicated.

Q. Now, after these cards are prepared and—the system is at the Ford plant they send them to the accounting department, and then the accounting department, from time to time, makes out cards of the type shown in Exhibit G, a cost summary card. I will show you just one of those cards. I think if you will see the card you will no doubt understand it a little better. We have here, this is Exhibit F-3, a cost summary card for the T-410 cam shaft. That was the cam shaft used on the model T. Now, you will notice on this card for July, 1924, we had the department 410, another department 819, both of which departments had to do with the various operations, and it gives the production for the month, the total production for the department, and then it gives a labor cost and a burden cost. Now, this labor and burden cost are prepared according to the system at Ford's from the—is that Form 2202, Mr. Hovis?

Mr. Hovis: The Ford Company uses 2202 for the basis of the cost summary cards.

Q. You understand the system I just outlined? A. Yes. I see it on here, too.

Q. Do you keep a record of that type at the Hudson Company? A. No, sir. All we keep a record of for that part is for material cost, the labor cost, and the time we were making it in the current production, and the overhead of the department it was made in. That is for service only. For production, we do not keep any cam shaft cost whatsoever.

Q. Do you have at the Hudson Company, Mr. Hogelan, any record similar to this operation sheet, Exhibit M? **(1678)** A. Not in the cost department. All we know is the total cost at the bottom for machining the cam shaft.

Q. Do you know whether they have records of that

type anywheres? A. They carry them in the time study department while the part is current.

Q. Do you know how long those are preserved? A. Until the part becomes obsolete, and then they throw it away.

Q. Now, as a cost accountant, Mr. Hogelan, would you state what would be your personal practice if you got a cost of a single operation and, let us say to make it pertinent, an operation of roughing the contours of the cams as is shown by the cam shaft, Exhibit 234, and let me show you also another exhibit here, Exhibit 29. Exhibit 29 shows a shaft in condition for the operation of removing the excess stock off the cams, and putting the shaft in the condition such as shown in this Exhibit 234. Suppose you had a production machine for doing that particular job, and you had obtained the time from your time study department for that particular operation, and there was no change in the part or the machine, we will say, for a period of four or five years; would you take the time study given to you at the beginning of the period as sufficiently accurate to establish the cost during the four or five-year period, assuming there was no change made in the part, and no change made in the machine? A. Would the parts still be in production?

Q. Yes. The part maintaining the same operation on the same machine, running right straight along, and continues production during a four or five-year period? A. Well, I would say if the operations on the machining of the **(1679)** cam shaft didn't change; but, if any of the items such as the handling of this part that was in the department in the process which, due to reconstructing a conveyor and so forth, which might change the price, otherwise, we wouldn't.

Q. Assume the operation of that machine remains standard. A. There is only one thing that would enter this, and that would be the labor conditions where the rate per hour would be changed.

Q. Of course, that should be taken into consideration, of course. A. When we change our base rate upon which our time studies are set, then we would change the price of the piece; other than that, we wouldn't. Because, our

time studies are based in hours. We are not interested in dollars and cents, as far as the shop is concerned, for machining this. It is hours.

Q. If you happened to have some U. A. W. difficulties, that might change the situation materially, too? A. We have a lot of that.

* * * * *

(1696) Re-Direct Examination by Mr. Farley.

Q. Do you understand as an accountant, Mr. Hogelan, what it would mean to make a group of machines in the plant for doing one separate operation, let us say, on a cam shaft, a cost center—you understand what I mean by that? That is, to separate your cost so that, assuming we have a battery, we will say, of ten or twelve or fourteen machines, let us say, performing this specific operation of turning the cams of the cam shafts, to use those as a cost center, computing the area of space in the plants which they occupy and then allocating all of your overhead or burden costs to each separate battery or group of machines all throughout the plant on that sort of a basis, so as to separate your burden and all your other costs to each particular operation—you understand what I mean? A. Yes, sir. We center our burden to the entire motor.

Mr. Spohn: What was the answer; I didn't get that?

The Master: "We center our burden to the entire motor."

(1697) Q. (By Mr. Farley): Do you think it would be feasible, or would you recommend to your company that they adopt this segregated system of costing? A. No, sir. For this reason: That we are only interested in the cost of building an automobile, and not any individual parts.

Q. And would the same answer apply, for example, to job costs? That is, it is practically the same question, but, just simply phrasing it in different language, that instead of selecting a group of machines as a cost center, that you allocate your costs, let us say, on a job on the cam shaft, separating it, or segregating it and having costs to which you allocate burden and everything else of that type to

each particular part of a car? A. No. We have division center such as a motor, transmission, clutch, paint shop, trim shop, body building, and, we allocate all the parts relative to those groups to that split-up.

For instance, all the parts in a motor, whether it is a piston, crank shaft, or a cylinder block, carries the same overhead, as long as it is built in the motor division. No matter what it is, if it carries the share of burden in proportion to the direct labor that is on that part.

Q. Do you think it would be profitable to your company to make a separation or segregation of the type I have just mentioned? A. I do not. I do not.

Q. You would not, therefore, recommend to your company that they adopt any such system? A. I would not.

Q. Now, considering, for instance, the difference in early **(1698)** production between the Ford Company and the Hudson Company, do you think it would be profitable for the Ford Company to adopt such a system?

Mr. Spohn: If your Honor please, that is a pretty drastic conclusion to ask of the witness.

Mr. Farley: That is exactly an answer given by Mr. Moise on one of my questions on cross examination, that if the Ford Company would be profited if they adopt such a system.

Mr. Spohn: Well, didn't counsel ask the question?

Mr. Farley: All right. I am entitled to have an answer here as I was from Mr. Moise. The only difference being here that we have a disinterested witness.

Mr. Michael: I take exception to that.

Mr. Farley: Take all the exception you like. It is the truth, and you know it.

The Master: I think you might re-frame your question to ask the witness—

Mr. Farley (Interposing): Very well, if your Honor please. After all, you have the burden of attempting to separate the chaff from the wheat, and, I would be very much appreciable, if, considering the things that you have to decide upon, you will ask the question to decide any problems you might have in your own mind.

The Master: Well, would you have an opinion whether or not it would be advisable for the Ford Motor Company, with its larger production, to—

(To the reporter): Will you read back the last few questions of Mr. Farley, and the answers by the witness, Mr. Reporter?

(1699) (The record was then read by the reporter.)

The Master: Well, do you have an opinion as to whether or not the Ford Company, with its larger production, ought to adopt such a system, or whether or not it would be advisable for it to do so?

A. My own opinion would be this: That it would be a tremendous undertaking to try to keep it when I don't think it is necessary to arrive at a cost of an automobile.

Mr. Farley: Do you think it would be of any value after you got it?

A. No, sir.

* * * * *

Pierce Albert Weyl was thereupon called as a witness on behalf of the Defendant, and having been first duly sworn, testified as follows:

Direct Examination by Mr. Farley.

Mr. Farley: Mr. Hogelan is excused, I assume?
The Master: That is right.

Q. (By Mr. Farley): Your full name, please? A. Pierce Albert Weyl.

Q. Where do you live, Mr. Weyl? A. In Dearborn, Michigan.

(1700) Q. And you are employed by the Ford Motor Company? A. Yes, sir.

Q. How long have you been employed by the Ford Motor Company? A. Since 1927.

Q. In what department of the Ford Motor Company are you employed? A. In the engineering department.

Q. Which particular engineering department? A. Well, in design of the automobile and what we call a car engineering department.

Q. That is Mr. Shelldrick's department? A. Yes, sir.

Q. And, in addition to the car engineering department, they have also at the Ford Motor Company another engineering department under the supervision of Mr. Pioch? A. Yes, sir.

Q. And what does Pioch's department have to do with it, if you know? A. Well, Pioch is tool design, they design tools and dies, to use in machine tools in the shop for production.

Q. Whereas, your department, or Shelldrick's department, in which you are employed, has to do solely with the design and engineering of the automobile and the parts that go to make up the entire automobile? A. That is right.

Q. Now, what system, if any, do you have in Mr. Shelldrick's department to make a record of, or to take care of changes and design of a car, or parts of a car? A. We have one, what we call our engineering release system, and our model change on which we make handwritten or typed copy **(1701)** from our parts list. And, from that, an indelible is made, and, anywheres from 30 to 60 copies of that indelible are run off on a duplicator machine, and distributed to the various departments that are interested, purchasing and tool design, the department in the shop that is going to make the part, and the outside vender, if it is partially machined, or if it is forged before we receive it, the vender also gets a copy. The same procedure is followed through on changes and revisions that we make.

Q. Yes. A. Although it is carried on different form.

Q. Those cards to which you refer are commonly referred to around the plant as "Engineering Information"? A. That is right, "E. I."

Q. And, as I understand it, you have a separate card for each and every part that goes into the car, with, of course, the possible exception of what we might call standard bolts and nuts and screws, and things of that type, you wouldn't have to have a card for ⅜ths bolts, would you? A. Yes, sir, we have a card for everything.

Q. Is that so? A. Yes, sir.

Q. I am surprised to learn that. I didn't know that. A. Yes. On the smaller parts we have a card,

like on the 3/8 bolts, they will specify for a certain unit. On our parts list, we break that down to the application, to the units that are fastened together.

Q. I see. If you have 65 or 175 bolts of the same size, type and construction to be used in the part, you wouldn't have 65 **(1702)** cards for it? A. No.

Q. You would have one card that would say 65 parts? A. Yes.

Q. Well, now, are you familiar with those particular cards? A. Well, quite a bit, yes. I have handled that work for about a year on all of these new models we have had.

Q. I show you a group of cards (handing cards to the witness), and ask you if you can state first, are they regular records of the Ford Motor Company? A. This record has been discontinued, I don't know just in what year. This used to be used entirely as a summary of all the individual changes and releases, but we don't summarize it like this any more.

Q. Well, I would like to have you again just to keep in mind my question. Is that a regular record of the Ford Company? A. Yes, it is.

Q. You recognize that? A. Yes, I recognize that.

Q. As a matter of fact, these engineering cards were given to you this morning? A. Yes, sir.

Q. From the Ford Company? A. Yes, sir.

Q. Well, not this group of cards, because I had them here a day or two before, but just what parts do these cards refer to? A. This is a cam shaft model T-410.

Q. And those cards cover the construction of the T-410 cam shaft **(1703)** from the 26th day of November, 1907, on into and through to the—what date? A. December 7, 1926.

Mr. Farley: I wonder if your Honor would like to take a look at those for a minute?

The Master: Yes.

(Mr. Farley then handed the cards to the Master.)

Q. (By Mr. Farley): Now, those particular cards are—I don't know whether you noticed it—but they are entitled "Finish Drawing," and I have here a group of photostats. A. Yes.

Q. And the group of cards consists of 7 cards. Now, I show you another group of cards (handing cards to witness), which are entitled "Forging Drawing, T-410." A. That is right.

Q. And this second group of cards, which consists of card No. 1, card No. 2, card No. 3 and card No. 4 and card No. 5, cover what period of time? A. January 10, 1908, to October 21, 1926.

Q. Now, I take it that for parts of that particular type you have, therefore, two sets of cards; one set of cards covering the forging, and one covering the part in its finished condition? A. That is true.

Q. And as changes are made from time to time in either the forging or the finished shaft, all of such changes are made a matter of record on those cards, is that correct? A. That is true.

Q. Now, could you, by consulting the model T cards make a quick survey of the finished drawing cards, of the number of changes **(1704)** made in the period from 1907 until the end, in the construction of the part? A. (Referring to cards): It is approximately 56 different changes in construction.

The Master: May I see those?

The Witness: Yes, your Honor. (Handing cards to the Master.)

Q. (By Mr. Farley): Could you, by consulting the card of the model T-410, determine whether or not any of the changes that are noted on the card were made for the purpose of facilitating production? A. (Referring to cards): Mostly—I can pick them out by the men who requested the change.

Q. How? A. Pick them out by the men who requested the change, the authority of the change on here; the changes not requested by men in the engineering department came from the shop.

Q. Do you find any such changes noted? A. Yes, sir.

Q. How many? A. (Referring to cards): I think there is 12 here.

Q. So, then, 12 out of 50 some changes that were made on the model T cam shaft in that period of time were changes requested by the production department. Now,

is there anything—well, of course, that shows there was nothing particularly unusual in that practice? A. No, there was nothing unusual.

Q. Well, will you consult the card—I think as long as we are going to put photostatic copies of these in evidence, that I **(1705)** would like to have you refer to the particular changes, by whom they were requested, so that we may know just exactly how you decided that?

The Master: In other words, you want him to state—

A. (Interrupting): Authority, the name of the man.

Q. Yes. How you reached the conclusion you just gave in your last answer.

The Master: Of the 12 that were made by the men in the shop.

A. Yes. Now, there is one by Martin. There is another one by Martin; Banta, Degener, three more by Banta, one by Perini, another one by Degener; there was one by Wandersee; another one by Degener; here is one by Endict; one by Rouse; one by Thrall.

Q. I notice one on this card, No. 3, on the back of it, 6/24/19, by P. E. Martin. You didn't refer to that particular one. A. Well, the reason I didn't refer to that was because P. Martin comes in the engineering department quite a bit, although he isn't in the engineering department. I mean I am just picking out the ones from authority that didn't originate in the department. P. E. Martin—

Q. (Interposing): P. E. Martin is in charge of the department, in charge of production? A. Yes, sir.

Q. Now, let's see, that particular change is brought up to date by specifying these shafts to be copper-plated? A. Yes, sir.

Q. A thousandth and one-half thick, .00156, before grinding? **(1706)** A. Yes.

Q. That would only have to do with production, wouldn't it? A. Yes, that is true, yes. Here is another one (indicating), by Wandersee.

Q. That is on card No. 5? A. Yes. Here is another one by Wandersee, on card No. 5. Here is two (indicating) on card No. 6 by C. Martin.

Q. Who was C. Martin? Do you know who C. Martin is? That is Charlie Martin, isn't it? A. Yes, Charlie Martin. This was—let's see—that was 1924.

Q. Chuck? A. I know where he was in 1927. He used to go between the engineering in Highland Park.

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(1707) Q. (By Mr. Farley): In other words, how many, roughly how many **(1708)** are there in Mr. Shelldrick's department? A. That can sign these cards?

Q. No. But, how many are there in the department, all told, at the present time? A. I would say about 150.

Q. About 150? A. Yes.

The Master: And there are just about three that could sign the cards?

A. Yes, with the authority to put the change through.

The Master: Are there similar conditions as to the men in the shop that can put a change through?

A. The men in the shop can only request a change to the engineering department, and the authority for the change comes out of the engineering department.

Q. (By Mr. Farley): Well, the proportionate men in the shop, there are a few of them that have sufficient authority to authorize a change. How many men are there in the shop, as far as you know, that have the authority to put an engineering change through on production? A. A. Well, nobody in the shop can put an engineering change through. Anybody in the shop that is familiar with the job can request a change, and if the engineer sees fit to make that change to accommodate them, or to reduce costs, or to increase production, why, then, we do that.

The Master: Well, suppose for example you have an operator running one of these machines and he thinks it would be a good idea to change the design of the part to better suit the machine; could he go right to the department, and would **(1709)** his name appear?

A. No, no, his name would not appear. The engineer approving the change, his name would appear there.

The Master: Well, then, how do you get the name of anybody not in the engineering department on these cards?

A. Well, these cards—

Q. (Interposing): Well, take Martin's name, for example. Is P. E. Martin in a sufficient authority in the company to order that an engineering change be put through?

A. Oh, yes.

Q. Whether your department approves of it or not?

A. Oh, yes.

The Master: Well, is that true of some of the men in the machine design department, machining engineering?

A. No.

The Master: Pioch's department?

A. No.

The Master: Well, how does Charlie Martin's name get on the cards, then?

A. Charlie Martin's name gets on the card because he probably brought out a blue-print from down in the shop or some place else, and signed the blue-print, dated it, for record, and we consider then that the change was requested by Martin, Charlie Martin; see? We do that same thing today. Every shop foreman that sends in a marked blue-print for a change, and the change is approved, that record or print will go in our file, and his name will be on that print, although, usually today, the only authority that will appear will be somebody in the engineering department whose name will not appear unless it **(1710)** is on a communication attached to our record.

I will say this, that as a general rule, a majority of the changes originate in the engineering department, due to some changes in the design, but a good many of them do come from the shop; and just how they get into the system, into the records, finally, there may be a record of who requested it, or there may not be. The authority, oh, usually comes out of the engineering department today.

The Master: So, there may be a change, and the initiative of which will come from the shop, and, yet, so far as the cards are concerned, the name of the party identified with the change will be the name of someone in the engineering department, rather than the man in the shop who initiated the change?

A. That is true. You understand that this is not the record of the change. We have another set of records—I don't know about these model T records, but, at the present time we have another—our indelible record, the individual sheet that covers this change will sometimes show "Requested by so and so."

But, for instance, if our service department requested a change, we will say "Requested by service department," or "Requested by Briggs," or "Requested by Murray." This is a summary.

The Master: This is a summary of the changes made?

A. Yes, sir.

The Master: Or changes listed were made?

A. Yes, sir, this is just a summary. This is not the complete breakdown.

Q. (By Mr. Farley): Will you take again another survey of these **(1711)** cards and see whether or not any change was made in so far as the cams of the cam shaft are concerned? A. On both forging and finish?

Q. Yes, I wish you would, on both forging and finish.

The Master: Which cards are you taking up first?

A. I will take up the forging.

The Master: Yes.

A. Card No. 1, 2/12/09, relative positive between exhaust and inlet cam was formerly 109 degrees. This has been changed to 111 degrees to conform with Mr. Degener's sample shaft.

9/1/09 added 1/16th finish to front end of first cam, and put ⅛ clearance slot on machine drawing.

The Master: All right, go ahead.

A. 11/14/12, changed angle between inlet and exhaust cams from 111 degrees to 115 degrees and 45 minutes. Do you want to read the whole thing?

The Master: I don't think we are interested in the angle.

The Witness: What are you interested in? In the machining of the cams?

Q. (By Mr. Farley): Well, that particular part you are referring to refers to the fact that often the shop does not have sufficient stock to finish? A. Yes.

Q. That is all right. Well, the change in 1912, December 19, 1912, shows that a change was made in the drawing because the forging companies were making cam shafts in which to have their dies constructed in a certain way. That was a change to facilitate production, apparently, was it not? **(1712)** A. Yes, that is right.

Do you want all the changes on the cams?

Q. No, I don't think so.

The Master: This discussion can be off the record.

(Discussion off the record.)

A. In 1/18/1916, change diameter for face of cams from 7/8 of an inch to 57/64 of an inch. This change to take effect on all dies which are being made, and on all old dies when they are re-sunk.

On 1/16/1919, change diameter of cams at face from 57/64 of an inch to 59/64ths of an inch.

The Master: What does that mean?

A. That is the low limit, and this is the high limit; from a low 57/64ths to a high 59/64ths.

The Master: Why don't they give limits in the original figure here?

A. Well, they didn't have any there. They just added a limit there. Probably somebody made some under size, and, then, we added a limit, so we never get under the 57/64ths.

And, 3/11/24, added 3/16ths to front end of exhaust cam, No. 1, changing the length from 15/16ths of an inch, to 1-1/8th inches, and the distance between cam and flange from 1-55/64 to 1-43/64.

Q. That particular change, right there, Mr. Weyl, had to do, as I understand the note, with the distance of the spacing of the cam adjacent to the flange in the front end of the shaft, is that right? A. That is right. That is what it says.

Q. And that change tended to decrease the distance between the **(1713)** flange and the end of the cam, isn't that right? A. That is true.

The Master: And also lengthened the—

Mr. Farley (Interposing): And also lengthened the width of the cam.

The Witness: And also lengthened the width of the cam, that is right.

Mr. Farley: All right.

Q. (By Mr. Farley): And what was the date of that particular change, did you mention that?

The Master: That was mentioned.

A. That was on 3/11/24.

Q. I see. All right. A. That is all I can find with relation to the cams on the forging.

Q. Yes. A. On the finish drawing—

The Master: Start right there—this can be off the record.

(Discussion off the record.)

Mr. Farley: I think, Mr. Weyl, if you just run through now, until, let us say, the period around about —just take a look at 1914—any changes from 1914 on for a year or two—well, suppose you jump to 1924.

The Master: In fact, to get the record straight, why not start in at a period from 1907 to 1914?

Mr. Farley: All right.

The Witness: I have gone over all of them, I think, down—

The Master: You can keep this discussion off the record, **(1714)** Mr. Reporter.

(Discussion off the record.)

The Witness: There is one on June 11, 1912. It says, "re-design, bring the shape of cams up to date with the change made on T-533, also changing the angle between the exhaust and inlet cams from 111 degrees to 113 degrees, 25 minutes; this change to take place on 1913 cars. If, however, there are any cam shafts of our present design left over, they are to be used up before starting on the new forging drawings, will not be affected by this change."

And, 9/21/12, change diameter for base of cams from .8125 over .8130 to .812 over .813.

Q. I notice as you are going over that particular one, that on card No. 2, the change on March 7, 1916, which states that the change was made in order to avoid trouble that occurred when assembling the parts; that is correct? A. Yes.

Q. Of course, that was a production difficulty that that change was made to overcome? A. Yes, sir, that is right.

Mr. Farley: I will tell you what, if I might make the suggestion, if your Honor please, I haven't asked Mr. Weyl to study these cards particularly. He had no idea what I was going to ask him. I have a witness that is very eager to get away. I wonder if I could have Mr. Weyl study over these cards, and we might save some time, and he could come back on the stand, and you would know, then, and you wouldn't have to spend the time looking over the cards. Would that be all right? Any objection to that, Mr. Michael?

(1714½) Mr. Michael: No, not at all.

* * * * *

(1737) Pierce Weyl thereupon resumed the stand as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified as follows:

Direct Examination by Mr. Farley (Continued).

Q. During the time you were off the stand, Mr. Weyl, have you consulted those cards to pick out quickly the places where the cards show a change in the shaft having to do with the cams? A. I will just give you the date, and if you are going to have photostatic copies, you can look at it. On the forging drawing on T-410—

The Master: Haven't you already gone through that?

Mr. Farley: I think you went through the forging drawings before. I think now you might go to the finish drawings. I think you discussed the forging drawings fairly well.

A. There are five changes on the cam in the forging drawing.

The Master: You also covered part of the finish.

The Witness: There are 11 changes on the finish drawing.

Q. (By Mr. Farley, continuing): That is relating to the cams? A. That is relating to the cams; either the ends or somewhere on the cams, the machining of the cams. That is on the model T. Do you want the model A?

Q. Yes. Will you consult the model A drawings? A. On model A—

(1738) Q. (Interposing): Just a minute on model A. What does your information show the date the model A, the first engineering information for cam shaft, for June 16? A. June 16, 1927—no, June 10, 1927.

Q. What does the June 10, 1927, date show? A. Release for production.

Q. That the part was released for production on that date? A. Yes, sir.

The Master: What card would show the dimensions when it was released for production, and other specifications?

A. The drawing of that same date would show what that was at that time. The record drawing.

Q. (By Mr. Farley, continuing): Just on that point, Mr. Weyl, I think if we refer to the blue-print that is in evidence, the blue-print A-6250, which is Exhibit 2, attached to the statement of account Exhibit "C," now this particular drawing contains in the box in the upper right-hand corner the date of 6/3/27; is that right? A. That is true.

Q. Now, how about your engineering information? A. It says it was released for production on 6/10/27.

Q. Is there a similar notation on the drawing? The first change— A. (Interrupting): The first engineering date on the drawing is 6/24/27.

Q. And, do you have a notation on the card? A. The card says on that date the contour of cam changed in accordance with change on finished shaft; flanged diameter reduced from 2-15/16 to 2-7/16 diameter.

(1739) Q. On the card, engineering information card A-6250-A-1 it shows on the date of June 24, 1927, release for production, and a change made in the drawing? A. That is right.

Q. Now, what does the drawing show? Does that also contain that date? A. It contains that date. That is the first release on the finish drawing.

Q. And, I notice in the box in the upper right-hand corner of the card it has the number 813. A. That has also 813; that is the release, E. I., engineering information number.

Q. And the engineering information card, No. 1, for the A-6250 shaft contains—the first item is item 813, that corresponds to the first change in the drawing? A. Yes.

Q. That, so far as the system works, so that the Court may understand it, at a time a change is made in the drawing, the exact information concerning the change which was jotted is down on the engineering information card, is that correct? A. That is correct.

Q. Now, suppose that your first change, reduce diameter of cam gear flange from 2-13/16 to 2-5/16; that would entail, would it not, making a change of the dimension, that particular dimension, as it appeared on the drawing as originally made? A. Yes, sir.

Q. Just how do you go about doing that as far as the original drawing is concerned? You have a tracing of it, and take the original tracing and erase the figure that was there before, **(1740)** and put in the new figure for the dimension? A. That is right. We keep a record blue-print of the way it was prior to the change on the tracing.

Q. And, in addition to that you have the other record? A. Have this record also, to tell what change was made.

Q. I see. So, taking any one of these sets of cards, and a blue-print such as Exhibit 2, you can take this blue-print too, and beginning with the last date that was given, you could trace back through all of these engineering information numbers, as contained in these cards, exactly what had happened, every change that had been made back to the date the drawing was first made? A. Yes.

Mr. Farley: Do you understand that system, your Honor?

The Master: Yes.

Q. (By Mr. Farley, continuing): Now, I call your attention, Mr. Weyl, to the second item on card No. 1 of the A-6250 shaft, which says, "Two intermediate bearings"—without bothering with the dimensions—well, "1.599 diam-

eter by 7/8 inch long added." Can you explain just what that would mean? A. It would mean it added a couple of intermediate bearings. There was one there and one over there. You can see it faintly on the print here (indicating). See that outline there. And this faint outline here, that didn't get quite rubbed out hard enough.

Q. And two bearings. A. Two additional cam shaft bearings were added at that time.

(1741) Q. And those bearings would be between what cams, as you number the cams? The cams are numbered on the drawing here. I see there is the faint line indicating that addition between the No. 3 inlet, and the No. 4 inlet, and a similar bearing was added between the No. 1 inlet and the No. 2 inlet? A. That is right.

Q. But, those bearings are not, however, shown on this blue-print, Exhibit 2, except the faint indication indicating they had been erased? A. Then they must have been removed at a later date.

Q. Now, if they had been removed at a later date, would you find anything on the engineering information cards? Will you look and see, please? A. (Examining cards): They were removed here 9/28/28; removed under E. I. No. 10419.

Q. That is the 8th change noted from the top on the blue-print? A. That is right.

Q. Under engineering information No. 10419, and the date of 9/28/28? A. It says, "Remove second and fourth bearings," so that is when those bearings were taken out.

Q. Now, I think I will—I don't think it is necessary to spend the time to go over all these other cards A-6250. Will you just state, after considering those, what changes, if there are any important changes in so far as the cams are concerned? A. It says here, "Change heel diameter of cam," on 9/28/28, when they removed the second and fourth bearings on that same change, they changed the heel diameter of the cam from .954 to **(1742)** .953/.955 and specified heel of cams to be concentric with bearings within two-thousandths.

Q. Of course, the change there was really no change in the actual dimension, but it gave the shop a one-thousandths variation below, and a one-thouandths variation above the .954? A. That is right.

Q. But, this changed, possibly, the accuracy within which the heel of the cam should be held relative to the bearings? A. That is right.

Q. Now, I notice, Mr. Weyl, that the blue-print on the model A job does not, as far as I have been able to determine by studying it, give any indication to the shop as to the amount of material to be left on the cams after the rough turning, and for assembly finish and finish grinding.

Mr. Michael: May I have the question?

(Question read by reporter.)

A. No, there is no allowance made there.

Q. Do you know what your practice is in that respect as far as the engineering department is concerned? Do you make it a practice to specify that amount to be left in the shop, or do you leave that to the judgment of the shop foreman? A. We leave that to the judgment of the production men.

Q. Now, were you in the engineering department during the design of the model A? A. Yes.

Q. Do you know Mr. Pioch? A. Yes, sir.

Q. Can you state whether or not during that period you saw Mr. **(1743)** Pioch around your department during the time model A was being designed? A. Almost every day.

Q. Can you state whether or not, to your knowledge, your department works with Pioch's department and whether, if at any time changes are made by your department in the design of any of the parts which go on the car, like the cam shaft, at the request of Pioch's department or to facilitate production? A. Yes, we make changes to facilitate production whether requested by Pioch or somebody else.

Q. That is not at all unusual? A. No. It is common practice.

Q. And, the engineering information shows that as far as the model A-6250 shaft was concerned, that changes actually were made in the bearings of those shafts? A. Yes, sir.

Q. We had testimony from Mr. Pioch that it would be feasible to make a change in the design of the bearings

of the model A shaft by cutting off some length, say, making the bearing a quarter of an inch shorter by increasing its diameter so as to keep the same area, surface of the area of the bearing. Would you state whether or not that would, in your opinion, be feasible?

Mr. Michael: Well, now, your Honor, I don't think this witness is qualified.

The Master: I don't think you have qualified this witness as yet. You will have to show he has more experience in the designing of automobiles.

(1744) Mr. Farley: That will be very easy.

Q. (By Mr. Farley): Do you, yourself, design parts for the automobile? A. Yes, I have. I am not doing that work right now, but I have all through, ever since I went with the company.

Q. Have you had some experience in engine design? A. Yes, sir.

Q. Well, let me put the question this way, whether or not you qualify as an engineer? A. Well, I am a graduate engineer of the University of Michigan, 1920. I have worked for Continental Motors and other manufacturers.

The Master: In the engineering department?

A. Yes, sir.

Q. (By Mr. Farley): Are you a graduate in engineering from the University of Michigan? A. Yes, sir.

The Master: Would you feel qualified to state as to whether a change in the bearings in the cam shaft would be feasible or not? Are you familiar with that part of the car and its function sufficiently to make a statement on that?

A. Yes, you could change the bearings.

Mr. Farley: First, are you qualified? Do you feel you have sufficient knowledge? Will you answer that question first?

A. Yes, I think I have sufficient knowledge to determine whether the bearings can be changed.

The Master: Now, you better ask the specific question.

Q. (By Mr. Farley, continuing): Now then, the specific question, **(1745)** with the knowledge that you have, would you state, as an experienced engineer, and graduate engineer, if a change such as we have described of taking a quarter of an inch, we will say, off one end of the bearing, and increasing its diameter at the same time to maintain the same bearing area, whether that would be feasible? A. It is possible. You would have to work out the mechanics to get your loading to know what you could do. If you increase the bearing pressure—you figure on projected area, and you can make it longer, and a small diameter, and have the same projected area, as if you make it shorter, and a larger diameter. It is the length times the diameter that gives you your bearing holding.

Q. My question was directed to that. Of course, assuming you had in the shaft, as it now exists, a desired projected bearing area? A. Yes.

Q. And, if you shortened the bearing by one-quarter of an inch, it would then be a matter of simple engineering mathematics to determine the exact size or increase? A. That is right.

Q. (Continuing): —in the diameter that should be resorted to? A. That is right.

Q. To compensate for the shortening? A. That is right.

Q. Now, would you state from your knowledge of the Ford Company's practice whether a change of that type would be at all out of the usual procedure, assuming that the change was made for production purposes, to facilitate production? **(1746)** A. No. We make a change like that if we thought there was enough involved, or a good reason for it. We wouldn't like to do it every day.

The Master: If you increase the diameter of the center bearing, would you increase proportionately the diameter of the end bearings?

A. Yes. We increase all bearings because that is very likely line reamed or burnished.

The Master: Would you also increase the diameter of the flange?

A. Not necessarily. That gear fastens on here. I don't know how the gear fastens on here. It wouldn't be

necessary to increase the size of this flange if this gear that fastens on here is keyed on from this end.

The Master: Would there be any reason for altering the size of the cams because of change in the diameter of the bearings?

A. No.

Q. (By Mr. Farley, continuing): The shafts you have before you, I will show you this shaft, Exhibit 33, the shafts you have before you are shafts not wholly completed? A. I see.

Q. Now, with respect to Exhibit 33, what means are provided on the flanged end for fastening the gear? A. This nut.

Q. That gear post end of the shaft is threaded, is it not? A. That is right.

Q. And having the threaded gear post end, that would involve no necessity to change the flange? **(1747)** A. That is right.

Q. One of the witnesses who testified concerning this proposition of the bearings suggested another alternative with respect to the—this is the rear bearing, is it not, the small bearing at the end opposite the flange? A. That is right.

Q. (Continuing): —suggested that parts might be made separately as a collar to slide over the end of the shaft. What would you say about that? A. That is not a good production job. I wouldn't say it was feasible. You could change this either in location or something else if you wanted to without any difficulty. That is on the back end of the block; you could move it backward or forward.

Q. How would that go as to a matter of Ford standards? You are pretty familiar with standards out there, aren't you?

The Master: How would what go?

Mr. Farley: I mean the proposition of making the bearing as a separate part.

A. I don't know of any place where we do it.

Q. The fact is in that respect the Ford Company, I think, is almost unique in insisting wherever possible parts be made integral rather than separate? A. That is the main principle of engineering we have; to reduce the number of parts.

The Master: You stated that you could lengthen the space between these bearings without any major alteration.

A. That is right. In this particular bearing here, there is **(1748)** nothing in the way, that I know of, on the car that would prevent you from moving that bearing back or forward here on the back end of the block. Up here you have your timing gear, which you have to take into consideration. This rear bearing, there is nothing in the way there that I know of.

The Master: Would you have to lengthen the rest of the motor design, or alter it, if you moved that back?

A. You would just have to put a boss on the back end of the block maybe 3/16 inch thick. It wouldn't be a very major change, I wouldn't say.

The Master: I suppose you are speaking now of the V-8 engine. Are you familiar with the A engine?

A. Yes, sir.

The Master: Whether the situation would be the same?

A. It would be the same on the model A. It would be the same on practically any engine. There is nothing in the way, as a general rule where this cam shaft lays on a "L" engine, which this is here. So I don't know what the removable sleeve idea is for. The main thing on this cam shaft diameter is this thing here. The diameter of the shaft between the bearings is what determines its rigidity more than the diameter at the bearing. It has a beam here that is supported in these two places. You have four loads on it; four valves.

Mr. Farley: I think that is all. I would like, of course, to introduce in evidence the—I think we might group these, if your Honor please; the model T-410 engineering information relating to the forging drawings, and consisting of five cards, all of the said cards having data typed on both **(1749)** the front and reversed faces.

The Master: Suppose you have an exhibit number marked on the front of each of these four sheets.

(Two groups of documents were thereupon marked Defendant's Exhibits 289 and 290, respectively, by the reporter.)

Mr. Farley: And, Exhibit 290 for the model T section drawing, engineering information, consisting of 7 cards.

Will you mark this, please?

(A group of documents were thereupon marked Defendant's Exhibit 291 by the reporter.)

Mr. Farley: As Exhibit 291, the engineering information cards for the forging drawings consisting of two cards. Will you mark these, please?

(A group of documents were marked Defendant's Exhibit 292 by the reporter.)

Mr. Farley: As Exhibit 292, the engineering cards for the finish drawings for the A-6250 cam shaft, consisting of 2 cards.

The Master: I notice on this Exhibit 290, card 6, a record of changes on the T-410 cam shaft under date of March 11, 1924. There is a notation entered: "Add 3/16 inch to front end of exhaust cam No. 1, changing the length from 7/8" to 1-1/16" and distance between cam and flange."

This gives rough turning specifications as well as grinding and inspection grinding specifications. Why do they have the rough turn specifications here, do you know? I thought you stated that the records here were solely on the **(1750)** finish size of the part.

A. Well, at this time on this drawing there must have been the rough turn grind, and inspection grind must have shown on the blue-print or on the tracing, and then this change was made. That is the only way I can explain it.

The Master: But, ordinarily, you didn't—

A. (Interposing): Ordinarily we don't show that rough turn grind and inspection grind dimension on a drawing. We give on the forging drawing—there will be a limit, high and low limit on the diameters, and then there will be on the finish drawing a finish diameter with a tolerance, and that is all. As this is in this card, it was on the drawing, I am pretty sure.

Q. (By Mr. Farley, continuing): I notice, referring to the model T drawing, which is Exhibit 1 attached to our Exhibit "C," that, as for some of the dimensions, they do give the grind and the finish grind.

The Master: Do they do that for the diameter of the cam?

Mr. Farley: I will let the witness answer.

A. On the cam it is usually shown on another—the cam outline is usually shown on a different drawing; cam contour.

Q. (By Mr. Farley): Well, they give one dimension here for the center bearing, and it gives that for the center bearing. I notice in the view here at the left of the sheet we do have rough diameter of cam? A. Yes.

Q. .860 to .870, and finish grind, .810 to .813. That would mean about fifty-thousandths left after the rough turning and finish grinding? **(1751)** A. That is right.

Q. Twenty-five thousandths on the side? A. That is right.

Mr. Farley: I think that is all. You may cross-examine.

Mr. Michael: Did you offer these cards, Mr. Farley?

Mr. Farley: I think I did. I had them marked, and, of course, I now offer them.

Mr. Michael: I would like a question or two on them.

The Master: Go ahead.

Cross Examination by Mr. Michael.

Q. As I understood your testimony, Mr. Weyl, these cards that have been offered here as Exhibits 290, 289, 291 and 292 relate only to the rough forging drawing and the finish drawing, is that correct? A. Yes, sir.

Q. And they show nothing regarding tolerances, dimensions or what not, for any of the operations intermediate the rough forging and the finish job? A. Oh, yes. They will show the intermediate operations if there has been a change between a forging and a completely finished job.

Q. I mean a change, now, that does not change the product; merely a change in tolerance in the job. A. That change shows on these cards; the change in tolerance shows.

Q. I understood you to say the cards didn't show anything of that kind; you left that to the shop? **(1752)** A. What I said there was the amount they leave for finish grinding. On the model there it doesn't show any tolerance for finish grinding, or anything like that, so that won't show on this card; but, if on the forging drawing we find that we haven't got enough stock, which shows in some of these cards here, we might increase the diameter of the forging at a certain place to allow enough stock to be finished off, and that change in dimension, increasing the amount of stock to be finished off, will be shown in this record.

But, if the shop wants to make three cuts to remove that from the forging down to the final finish, that is up to them. We don't tell them to take off twenty thousandths on the first cut and ten thousandths on the next, and then five thousandths grind or three thousandths, or so.

Q. If they want to reduce the amount of stock left on the cams on the turning operation from 60 thousandths to 40 thousandths, that would be up to them? A. That is pretty big, 60 to 40 thousandths; it might require a change in the forging itself.

Q. Supposing you had a different machine that came into the department for turning the shafts. That wouldn't show on these cards, would it? A. No, the machine wouldn't show.

Q. And, if after they got the machine operating they cut down the tolerance, that wouldn't show on the cards? A. What tolerance do you mean?

Q. The tolerance for turning the cams on any machine? A. No. Except in this case we show on the model T where we do allow a rough grind and inspection grind. I don't find that **(1753)** came on any of the later records.

Q. And, you said that was exceptional? A. That is right.

Q. And wasn't commonly done? A. That is right.

Mr. Michael: I don't know what the purpose of these cards is, Mr. Farley. I would like you to state what you expect to prove by them.

Mr. Farley: We expect to show by the cards, in view of the great deal of examination, that in so far

as any major changes were concerned, there were no major changes with respect to the contour of the cams during all the model T, or the model A production, and also we show the fact that these cards fully corroborate the testimony of Mr. Pioch, and also the testimony just now given by Mr. Weyl, that it is not only nothing unusual, but rather common practice of the Ford Company to make changes in the design of a part to facilitate production from time to time; also, that in this very instance of the model A shaft, changes were made even after they got in production in bearings for bearing size, and that sort of thing.

The Master: The question which came up in response to which, I think—or in answer to which I think you were going to prove these cards was in connection with the question of whether the straightening operation might not have been added because of reducing the tolerance in the rough-turning operation because of more rigid specifications as time went on. These cards would not conclusively answer that—

Mr. Farley (Interposing): I think they would, if your **(1754)** Honor please, on the model T job, because, as you note, the drawings on the model T, this one drawing does give tolerances and amount between rough grind and finish grind on the shaft, as well as on the cams. Now, if any change had been made during the time when the shift-over occurred from the shaper to the Melling cam lathes, it should be on the card.

The Master: In the first place, the drawing that you have does not show the tolerances for rough turning the cams themselves, but only the margin in between the cams.

Mr. Farley: No. If your Honor please, I will have the witness testify.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. On the view at the right of the sheet, on the left-hand side of the sheet, I call your attention to rough diameter of cam; .860 to .870; finish grind .810 to .813. Will you state just what part of the cam shaft that dimension is given for? A. That base circle diameter of the cam.

Mr. Farley: Of the cam?

A. Of the cam.

Mr. Farley: That is for each and all the cams?

A. The bottom part of the cam.

The Master: Do you know whether this rough diameter given is the rough forging diameter or the rough turning diameter?

A. That is the turning diameter, if it is within 10 thousandths.

Mr. Farley: Yes, that gives the diameter of the cam, and if you allow that material, that amount of material for the **(1755)** turning operation, and between the turning and the finish grind on the base circle of the cam, can you state whether or not that same tolerance would prevail as to the rest of the cam contour?

A. Very likely it would be about the same.

The Master: Of course, if this were—this has been stated to be an unusual case where the rough turning diameter is given in the drawing, and also indicated in certain of the changes, and if the foreman were given to understand that by and large the only thing that they had to be concerned with, as far as measuring up to the requirements of the engineering department was concerned, was the finish size, the foreman might well make a change in the tolerance, which they required for the rough turning, without notifying the engineering department.

A. That is possible, but it isn't very likely. If they want to change any dimension on these prints, they should notify us to put through a change in whatever dimension they want to change. Otherwise, our drawings would be of no value. We would think they are making it one way, and they are making it some other way.

The Master: Does the foreman have these drawings in front of him?

A. Yes. Anybody in the plant has a blue-print.

The Master: If the foreman made a change in the tolerance and rough turning of bearing, say either the center bearing, or one of the end bearings, he would not notify your department, would he?

A. He would examine the appearance on the drawing, because we have **(1756)** to change that dimension to conform to whatever he wants.

The Master: Does that appear on the drawing?

A. Rough turn and grind. If it doesn't appear on the drawing, he wouldn't have to do that. If it does appear on the drawing, he should notify us. All he has to do is send us a marked print, and mark on there he wants that limit changed; and then, as a general rule, somebody tries to find out why he wants it changed, and we change it.

Q. (By Mr. Farley, continuing): You went to the Ford Company in 1927 at the beginning of the model A production? A. Yes, sir, and before model A started.

Q. But, you were not there during all of the model T production? A. Just the latter part.

Q. Your testimony that it would be unusual is based on your experience in model A and V-8 production, isn't it? A. That is right.

The Master: Is it also based on an inspection of cards similar to this or to these cards produced for various model T parts?

A. Our system of handling a change on a drawing has never been changed. If anyone wants a change on the drawing, they are supposed to send a marked print to the engineering department, or a communication, asking the engineering department to make the change. The drawing is then changed, and a record and E. I. made covering that change, and usually it will say why the change was made, or revision.

The Master: But, as to whether tolerances, other than the tolerances for the finished part, are ordinarily given **(1757)** in the drawing, and whether such tolerances would—or, ordinarily included in your records showing the tolerances which are made, or showing changes in tolerance which are made on the finished drawing, as to whether that was at all common during model T production, you would have some information on that from an inspection of these cards and various parts in the past, would you not?

A. Yes. As I say, whatever is on the drawing, no matter what dimension is on that drawing, if anybody wants to change it a request has to go through the en-

gineering department to get it changed. If on this drawing it shows rough, and you might have a semi-finished rough, or rough, or a semi-finish, and finish and a grind, and if somebody wants to change those tolerances, or limits on there, the only way they can get it changed is to come to the engineering department because we have the tracing that this blue-print was made from, and if they want to make a change, they have to change the drawing. That is their authorization. They can't make a change without telling anybody; otherwise, they would be changing something we don't know about, which sometimes happens on a die, which when we are going into production, and they make a change on account of tearing metal, we might not get the change until three months afterwards; but, that is very rare.

Ordinarily, on machine surveys like this, they have to give us a marked print or a written communication asking us to change that drawing. If they don't give us it on the exact date, they will give it to us later and it will appear on **(1758)** our records.

The Master: Suppose a foreman decides that he wants a straightening operation previous to rough-turning the cams, which would enable him, on the rough-turning operation, to bring the tolerance limits from, say, .862 to .868.

A. Yes.

The Master: Instead of .860 to .870, which are the dimensions given in this drawing. If the department produced a finished cam shaft which had the limits between .810 and .813, nobody would particularly care whether the tolerances in the rough turning were changed or not, would they?

A. Well, you say nobody would care, but still the law is they should notify us that they want that changed. We have to hold that, because otherwise they would make all kinds of changes and we wouldn't know anything about them.

The Master: They would be more likely to notify you of such a change than a finish change?

A. Yes. They could go ahead and vary just a little bit, and we wouldn't find it out right away, but if they change something else on here that the inspector would

catch, you would find that right away. Nobody is supposed to change any dimension on any drawing unless it goes through the engineering department for any limits.

Q. (By Mr. Farley, continuing): As far as a change of that type is concerned, I don't know whether you are familiar with the operation in that particular department—do you know whether you would, or have in that department—let me make it, do you know whether they did have in that department, or do have in that department, any inspection of **(1759)** the shaft between the rough turn and the various grinding operations? A. I don't know.

Q. You don't know? A. I don't know.

Q. Did you ever see them working in that department? A. Yes.

Q. Have you ever seen the snap gauges they use, particularly which they use after rough grind, or the rough finish, rather? A. Well, I have seen them make them, but I never paid any particular attention to it.

Q. At the present time, have you ever seen these snap gauges they use, for example, after the first grind? A. No. I never saw the actual gauge, I don't believe. I know this, if you leave too much metal on your rough grind, the fellow that has to do the final grinding is going to kick. If you take metal off so that they wouldn't have so much to grind off, we don't care.

Q. Suppose you take so much off and it doesn't clean up? A. Then, he will holler.

Q. As a matter of fact, in the department— A. You will find that has been done in these records here where we have added metal to the forging so that they can clean up.

Q. As a matter of fact, you use throughout the whole plant what we call upper and lower limit snap gauges? A. That is right; high and low.

Q. High and low, and they use those in the department for gauging the shaft after the rough-turning operation? A. I couldn't say that; I don't know.

(1760) Q. Suppose, if you assume they did use that, wouldn't it be necessary for the foreman, if he made a change, to have the— A. (Interrupting): He would have to change his gauges, too.

Q. Have the change made in the gauges? A. That is right.

Q. So that it come through? A. That would come through tool design; we wouldn't have anything to do with that.

Mr. Farley: That is all.

Re-Cross Examination by Mr. Michael.

Q. Mr. Weyl, if the Department 410 put in a bunch of new machines for turning the surfaces off these cams, and that automatically resulted in less tolerance or cutting closer to size, would that be reflected in these cards? A. The only way that would be reflected was if there had been some dimensional changes made.

Q. You have a dimension change here. Now, you put in a bank of new equipment, and change that dimension, is that reflected in these cards? A. If the dimension is changed, it should show in the cards.

Q. What is the date of this change we have been talking about here on card No. 6 of Exhibit 290? A. 3/11/24.

Q. March 11, 1924, is that right? A. That is right.

Q. What is the indication regarding the rough turn? A. Reduce the dimension from 1.958/1.962 inches to 1.771/1.775 **(1761)** inches.

Mr. Farley: Is there any change there in the tolerance; it is still four-thousandths tolerance?

A. The tolerance still remains four-thousandths.

Mr. Farley: But, the overall dimension is reduced approximately 2 hundredths of an inch?

A. That is right.

Mr. Farley: Just what part of the cam was that change made on?

A. The distance between the cam and a flange.

Q. (By Mr. Michael, continuing): It doesn't agree with the drawing? A. It doesn't agree with the drawing, no; there must have been another change after that sometime.

Q. Another change after the change noted on card No. 6? A. That is right. This one "A" (indicating).

Q. And, what does that have reference to? A. The distance between the flange and the cam.

Q. Well, is there any designation on this drawing, this Exhibit 1 attached to defendant's statement of account,

is there any designation in here as to the rough size of the cam?

Mr. Farley: What do you mean the rough forging size?

Mr. Michael: No.

A. Just on this basis here, there is rough diameter of cam .860 to .870.

Q. (By Mr. Michael, continuing): That is the rough turning size? A. It must be.

Q. Why do you say "it must be"? **(1762)** A. Rough diameter of cam .860/.870; finish grind, .810 to .813.

The Master: The reason you state that is because you think a forging can not be made, or, at least, those aren't practical—

A. (Interrupting): Limits on a forging.

Q. (Continuing): And this card No. 6 doesn't indicate any change in those matters? A. No, sir.

Q. And, one of the items it does indicate a change? A. This distance here.

Q. It differs from the notation on the drawing? A. Yes. Of course, there might have been a change after this, where that was changed again. You can't tell unless you go through the whole set of cards to find out that.

The Master: I will admit these exhibits in evidence. I think there is some evidence of the point, even if there were no reference at all to the rough-turning tolerances, because if the finish tolerances remain the same throughout the period, it certainly throws some light upon whether the rough-turning tolerances were materially changed.

Mr. Michael: It may throw some light on it, but the tolerances we are dealing with here, concerning with intermediate operations that may well enhance production; for instance, your finish grinder can turn out much better and quicker work if your tolerances are kept closer during the turning of the cam.

The Master: I think that is clear from the evidence.

Mr. Michael: That is all I have.

Mr. Farley: That is all. Thank you, Mr. Weyl.

(Witness excused.)

* * * * *

(1845) PIERCE WEYL was thereupon recalled as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Farley.

Q. You testified yesterday afternoon, Mr. Weyl, with reference to the model A shaft, and you called attention to Exhibit 2, the blue-print of the model A shaft, forming a part of Defendant's Exhibit A, to the places where the intermediate **(1846)** bearings referred to in the engineering information, Exhibit 292, had been on the shaft and had been removed. Now, also, in view of your testimony concerning the shortening of the bearings of about a quarter of an inch, you have now produced a blue-print in which you have drawn, in crayon, the intermediate bearings as shown, or as referred to in the engineering information card, and you have indicated on this drawing the shortening of the bearings, is that correct? A. Yes, sir.

Mr. Farley: I would like to offer that blue-print in evidence as Defendant's Exhibit 297 as illustrative of the witness' testimony yesterday afternoon.

(The document above-referred to was thereupon marked Defendant's Exhibit 297 by the reporter.)

Mr. Michael: Mr. Weyl, did you say yesterday that the model A shaft had actually been changed in this way at some time in production?

A. Yes, sir. These two bearings had been removed, and if it had been desirable to cut any length off of these other bearings, we could have put these two bearings back in and then removed an equal amount from the bearings that remained, rather than change diameters, this would really be a more feasible way to do it.

Mr. Michael: Then, this does not show anything you actually did?

A. No. It just shows a method that could have been used to perform the same thing as I was questioned of yesterday, how to shorten the bearings; the method of shortening the **(1847)** bearings.

Mr. Michael: Then, it is your testimony now that had you at some time or other decided to shorten the end bearings and the center bearing, you would have

added these two other bearings that you show here intermediate the center bearings and the end bearing?

A. I think that would have been the more feasible way to do it; yes.

The Master: You would have had to do some collar cutting around two bearings, wouldn't you?

A. Yes. That, of course, was in the block before we removed that bearing. I mean that was all in the block prior to the removal of these two bearings.

The Master: When were those two bearings removed?

Mr. Farley: What does the information card show as to the period of time and length of time in actual production the Ford Company used those intermediate bearings?

A. Two intermediate bearings were added 7/6/27, removed 2nd and 4th bearings 9/28/28.

Mr. Farley: You are referring to Exhibit 292 now?

A. Yes, sir.

The Master: Were there any changes made in the rest of the motor as of that date?

A. There must have been. When these bearings were removed very likely the collar for the bushing support and everything was taken off at the same time; that would show in the block record.

The Master: Do you know why those were removed?

(1848) A. No, sir, I do not. That probably proved to be unnecessary.

The Master: Would it make less parts to manufacture to remove the two?

A. It depends on whether we ran the bearing in cast-iron or not. I don't know. If we ran it in cast-iron it wouldn't make any difference, if we used bushings we would have two bushings.

Mr. Michael: Would you run a bearing like that in cast-iron?

A. Some.

Mr. Michael: You mean a cast boss on the inside of the motor block?

A. No, right in the block.

Q. You just mount the shaft on these two bearings right in the cast-iron of the motor? A. Some manufacturers do. I don't know whether model A was made that way or not.

Mr. Michael: If you did that, would the cards indicate?

A. No.

Mr. Michael: Do the cards indicate the addition of parts when this change was made?

A. I could trace the record and find out.

Mr. Michael: Do you know whether they ran these two extra bearings right in the cast-iron?

A. No, sir, I don't know.

Mr. Michael: Would you think they did?

A. I would think not.

Mr. Michael: And, if they didn't, what would have been **(1849)** required by the addition of those two bearings?

A. Two additional bushings.

Mr. Michael: And, the bushings would have been, there would have been the extra operation of mounting the bushings in the cast-iron openings in the motor block?

A. Yes, sir.

Mr. Michael: When they took the two bearings off, they would have saved—strike that out—were these added bearings just connected integrally with the shaft?

A. Yes, sir.

Mr. Michael: And then they, of course, had to be machined, and so on, and polished?

A. That would all be done when you machined the other bearings.

Mr. Michael: But, you would have had those added operations of machining and polishing those added bearings?

A. Just the tool maintenance on that, I would say.

Mr. Farley: Just merely added extra tools?

The Witness: That is all.

Mr. Michael: You would have to have a fixture in which were added two tools and two grinding wheels to take care of that?

A. That is true.

Mr. Michael: When you added these two bearings, did you shorten up the center bearings and the end bearing?

A. The record doesn't say so.

Mr. Michael: Do you know?

A. This is the record.

Mr. Michael: From the record—

A. (Interrupting): There were no changes made on the other (1850) bearings when those two were added according to the record here.

Mr. Michael: Then, you made no change in the center bearing or end bearing when you added these two bearings?

A. No, sir.

Mr. Michael: That is all.

Mr. Farley: As far as the use of any bushing, in case bushings were used they would have been employed in the shop in the period from July 6, 1927, to September 28, 1928?

A. Yes, sir.

Mr. Farley: That is all.

Mr. Michael: I object to the offer of the drawing as not showing anything that was done by the Ford Company or was apparently available to them.

The Master: Well, I will admit the exhibit in evidence as part of the defendant's proofs in connection with the possible modification of the shaper or of the bearings to enable the shaper to be used.

Q. (By Mr. Farley, continuing): There are four photostatic copies for the engineering information for the finish size for the period beginning June 16, 1918, and extending to November 10, 1928. There are two photostats for the forging engineering information ranging from the period of the third of July, 1918, to the 19th of January, 1926; is that correct? A. That is right.

Q. Now, the finish drawings, I note run to the latter part of **(1851)** 1928, and the last engineering information is added A. R. to symbol number indicating use for repairs on 1917-1928, Fordson. How is it, Mr. Weyl, that the forging engineering information seems to stop on the 19th of January, 1926, do you know? A. I can't explain that. Evidently when the part went for service we added A. R. to the finish drawing. The forging drawing was not—didn't have the suffix added to the number. It is an error on the part of somebody in the engineering department.

Q. You weren't able—there is no other card? A. No other card that I could find.

Mr. Farley: All right. I offer these in evidence as Defendant's Exhibit 298.

(A group of cards were thereupon marked Defendant's Exhibit 298 by the reporter.)

Mr. Spohn: All under the one exhibit?

Mr. Farley: All under the one exhibit; 6 cards.

The Master: They are admitted. There is no objection other than the one you made to the other cards?

Mr. Spohn: No further objection than that, but we may want to ask the witness a question or two.

Re-Cross Examination by Mr. Michael.

Q. Mr. Weyl, would you say from those last cards that Mr. Farley offered, Exhibit 298, that the tractor production started in 1918, or would there be cards prior to that? **(1852)** A. There is no card prior to that. But, I am quite sure we made some tractors prior to that date. How many, I don't know. We made some in 1917, as I recall.

Q. According to your recollection, is that when they started the tractor production, 1917? A. 1917 is when they

started to build them. Whether they were in production or just experimental models, I just couldn't say.

Mr. Michael: That is all.

(Witness excused.)

* * * * *

(1715) JAMES McEVOY was thereupon called as a witness on behalf of the Defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. Where do you live, Mr. McEvoy? A. 1771 Burns Avenue, Detroit.

Q. And, what is your occupation? A. I am a director in the Patent Section of General Motors Corporation.

Q. Did you receive a subpoena to appear here? A. I did. Here it is (producing document), half-past twelve today.

Q. And, have you any interest in this proceeding here? A. None whatever.

Q. How long have you been in charge of the Patent Section of General Motors? A. Since 1922, July 1st.

Q. In connection with your duties in the Patent Section of General Motors did you have any, or gain any, particular knowledge of a certain litigation brought against the General Motors by the Gordon Form Lathe Company? A. Yes, I did.

* * * * *

(1717) Q. Now, there was introduced here in evidence, Mr. McEvoy, as Defendant's Exhibit 71, an agreement between—"Made this 30th day of October, 1930, by and between the Gordon Form Lathe Company, a corporation of Ohio, and General Motors Corporation, a corporation of Delaware."

Did you have anything to do with the making of that agreement (handing volume of prior transcript to the witness)? A. Oh, yes, I remember that agreement very well.

Q. I assume prior to the making of that agreement you had many conferences with representatives of the plaintiffs? A. No, not many conferences; no.

Q. You had some, however? A. I, perhaps, had two or three.

(1718) Q. What was, if you recall, Mr. McEvoy, what was the first demand made by the plaintiffs on General Motors in connection with that litigation? A. The first interview I had with Mr. Richey, and I think Mr. Gordon, and I think two gentlemen from Milwaukee, two attorneys, as I recall, they said they thought the Gordon Company was entitled to $1,250,000 from the industry outside of Ford.

Q. I notice this particular agreement sets forth a consideration of $195,000. A. That is correct.

Q. And, was that the sum that General Motors paid to the plaintiffs here? A. That was the sum paid by all of the persons in interest.

Q. That sum covered—do I understand that sum covered the entire automotive industry with the exception of the Ford Motor Company? A. That is correct; yes, sir.

Q. And, I notice this particular agreement says that, in paragraph 1, after reciting the consideration, that the Gordon Form Lathe Company hereby releases and agrees to release General Motors Corporation, a corporation of Delaware, its subsidiaries and nominees, with the specific and sole exception of the Ford Motor Company. Did you have anything to do with the insertion of that exclusion of the Ford Motor Company? A. No.

Q. Who was responsible for the placing of that in this particular agreement, if you know? A. The Gordon Company. I don't know which individual connected with **(1719)** it would be responsible. But, at all times they said that the Ford Company was not to be included in the settlement, and we really were taking the matter up for the National Automobile Chamber of Commerce, of which Mr. Ford was not a member. So, there really was no reason why he should have been in this at that time.

Q. Do you know whether or not any knowledge or information was given to the Ford Company of the fact that a settlement was to be made? A. Not by me.

Q. Nor by anyone else, as far as you know? A. No, sir.

Q. Do you know whether or not any invitation was given to the Ford Motor Company to participate in that settlement? A. No, sir, we were not interested in the Ford Company at all.

Q. Now, in connection with the fact, and noting particularly that the settlement was finally effected by General Motors Corporation for a very much smaller sum than one million and a half or one million and one-quarter dollars, whatever you say, did you, at any time, in any interviews you had with anyone representing the plaintiffs refer to any of the defense material that Mr. Laughlin had uncovered? A. Yes, I think I did.

Q. Did the matter of the payment of so much per cam, or so much per cam shaft enter into the settlement which you made? A. No, only indirectly.

Q. In so far as your negotiations with the plaintiffs was concerned, that matter was never considered? A. Amount per cam?

(1720) Q. Yes. A. No.

The Master: When you say "indirectly," what do you mean by that?

A. Why, when we settled we acted for all of the concerns in interest. There were 14 of them; 7 automobile companies and 7 other companies who were using this patent, such as the Continental Engine Company, and so on. And, we undertook to make this settlement and pay the money, and then collect from each of the persons in interest their proportionate share based on the number of cams they made.

Q. (By Mr. Farley, continuing): Number of cams, or number of— A. (Interrupting): Number of cams.

Q. That, in reality, was an allocation based on production of the companies? A. Yes, sir.

The Master: Did you, in advance of the settlement, submit to the plaintiff any figures, or the plaintiff's counsel, any figures as to the number of cams that had been turned on the infringing machines?

A. No, sir, I never did.

Q. (By Mr. Farley, continuing): I note that this particular agreement refers to, in paragraph 8, "General Motors Corporation on its part agrees to indemnify and hold harmless the Gordon Form Lathe Company against any and all claims and/or demands arising out of or by virtue of contracts, copies attached hereto and made a part hereof, made by it with certain other parties, namely," the

J. I. Case Company. There are two agreements noted with the J. I. Case Company; two agreements with the (1721) White Motor Company; with the Nash Company, and one with the Chrysler Corporation. A. That is correct.

Q. Now, referring to the reference to the White Company there, do you know anything about the inclusion, or the reason for the inclusion of all of these companies here, including the White Company in that paragraph? A. Well, the Gordon Company had made agreements with these concerns prior to the settlement that we effected, and they simply put this clause in. It didn't really make any difference. I don't know exactly why they put it in, as a matter of fact. It was all concluded.

Q. They had some sort of a contractual agreement with those particular companies, as appears from the very face of this paragraph? A. Yes. They had settled with them.

Q. And they had made certain contracts with those companies? A. That is right. I couldn't tell you right now, Mr. Farley, what those contracts were.

Q. I appreciate that. A. I mean the form of them.

Q. Do you know whether you have, Mr. McEvoy, in your files copies of those contracts referred to, which it says: "Copies are attached hereto and made a part hereof"? A. Well, I ought to have them, or the attorney for the N. A. C. C.

Mr. Farley: In connection with that point, your Honor please, you recall the demand I made on the plaintiffs to produce the White agreements, and I would like to have the demand to produce extend to the agreements with the Case (1722) Company, because I found on further study of the record that plaintiffs also put in an agreement, or a release, with the Case Company. I think that is—

Mr. Michael: That is correct, and we would be glad to furnish all these contracts. They were given to the defendant in the trial below, and they returned them. They didn't want to use them, and there has been no demand on us since, until this session here in Detroit.

Mr. Farley: There would have been a long time ago if I had looked at those contracts below instead of Mr. Cooper.

Mr. Michael: Well, they were always available to you. They were offered.

The Master: Do you have those contracts with you here in Detroit?

Mr. Michael: Yes, we have them here in the hotel room.

Q. (By Mr. Farley, continuing): Now, do you know whether or not, Mr. McEvoy, the General Motors Corporation, as I understand it by this contract, they practically took title to the Gordon patent? A. I just noticed this clause (indicating), took an exclusive license as I remember, with the right in the Gordon Company only to prosecute a claim against the Ford Motor Company. That is the only interest in the patent that they reserved, I think.

Q. That is right. The contract provided that all title to the patent, except the reservation of the right to sue the Ford Company, went to the General Motors Corporation, including the right to the General Motors to sub-license to the companies? A. That is correct.

Q. Do you know whether under that contract General Motors granted **(1723)** any licenses to other companies? A. I think we did. I think we granted licenses to all the companies that paid, that contributed.

Q. And included in those companies were the licenses to the White Company, do you know? A. I don't think so, because that had already been granted. I don't really recall, but I don't see why we should have. I would have to look that up, Mr. Farley.

Q. Do you know whether or not General Motors Corporation made any payment to the White Company? Have you got any records or data which show that? A. I think we did, yes.

Q. You made some sort of a refund to the White Company— A. (Interposing): Made a refund to a number of them. I have the statement here—

Q. This matter—go ahead. A. I haven't anything to say.

Q. What is this (indicating documents)? A. According to this the Case Company paid Gordon $4,000. This is just my memorandum. I haven't checked this off to see if it is correct; and, also paid $1,056 for past infringement, $5,056; and, under this settlement we returned to the Case Company $5,000.64.

Q. Mr. McEvoy, did you attend to the details yourself of the adjustment of contributions? A. No, I did not.

Q. But, you knew generally? A. Yes, Mr. Arvedson, the patent attorney of the N. A. C. C. did that; George Arvedson.

(1724) Q. We have in evidence here a departmental communication with the White Motor Company that refers to a release and a sub-license received, apparently, by them December 31, 1931, and it contains a memorandum to the effect that a check for $3705.92 was received December 31, 1931, from General Motors Corporation representing the difference between payment of $6455.92 which they paid to the Gordon Form Lathe Company. A. Is that the White Company?

Q. Yes. A. Well, all of the financial transactions are handled by the General Motors Corporation. But, we acted upon the advice of Mr. Arvedson in the settlement.

Q. Would that be in accordance with your recollection that, as a matter of fact, General Motors Corporation did send a check to the White Company for a sum in the neighborhood of $3700? A. That doesn't show in my memorandum. But, this memorandum perhaps wasn't exactly accurate. The one I have here shows the White Company entitled to $525.04. This may not be accurate. This was probably made when we were first figuring on it.

Q. Well, could you state whether or not General Motors did send a check to the White Company? A. Well, I think so. I am quite sure they did. But, I hesitate to testify to something that I didn't handle myself.

Q. As to the exact amount, you have no particular knowledge as to the amount? A. Yes. I could get that for you.

The Master: How was the settlement figure of $195,000 **(1725)** arrived at?

A. Mr. Laughlin, on his investigation, got in touch with a Mr. O. W. Redlin, who according to the record of the Patent Office was a joint inventor with Mr. Gordon of this patent. This patent was issued to Gordon and Redlin.

Mr. Redlin, apparently, had little if any interest in the suit, but he became very much interested. He was the Works Manager Superintendent for the A. O. Smith Company of Milwaukee, and as I recall, had befriended Mr.

Gordon in a great many ways, and he was rather agitated about this suit. I don't think he liked it very much.

So, he undertook to see what he could do to settle it, and he came over to see me with Mr. Laughlin. He suggested $200,000, an arbitrary figure. I told him I wouldn't pay $200,000.

Then, he went back and called me up one day and said he could settle for $195,000, and I agreed to that, and then he sent me an agreement in which he purported to represent the entire Gordon interest which, undoubtedly, he did. That was agreed to about July 30, 1930, and I told him this isn't a settlement just for General Motors; it was a settlement for these 14 companies interested in the matter, and I would have to take it up with them to see if they were, to see if they would join in, and we wrote out exactly as we could the number of cams each one of them made, and the settlement was based on that. And, some of these companies like White and Case under that theory paid too much. That was why they received a refund.

The Master: Did you have any information prior to July, **(1726)** when you had this agreement with Redlin, from the other companies as to the number of cams they had turned on the infringing machines?

A. I don't think so. I don't really remember. I don't think so. Mr. Arvedson might have gotten some of the information from some of the automobile companies, but that I couldn't tell you, sir. I simply felt that it might be well to pay a little less than $200,000 to settle the thing and not have further litigation.

Q. (By Mr. Farley, continuing): Was that decision to settle for $195,000, did you, in connection with that, Mr. McEvoy, take into account the decision of the Sixth Circuit Court of Appeals in a case decided shortly before this settlement was made by the General Motors Corporation in the Gear Grinding versus Reo case wherein the Sixth Circuit Court of Appeals held that due to the fact that the Chamber of Commerce had taken over the defense of an earlier case filed against Studebaker, that that decision was res adjudicata as to all the members of the Chamber of Commerce? A. Well, I had that decision in mind, but I have never really recognized it. That was more or less of an obiter dictum of Judge Denison, but I did have that in mind; yes.

Q. With due deference that we always have to the Court of Appeals' decisions, you realized that there was a decision, but without wishing to attack the Court, you like to reserve your judgment as to the correctness of their law in that particular matter? A. Yes. I think they were mistaken. We all feel that way at times.

(1727) Q. That being said, of course, without in any way prejudicing you? A. Oh, yes. I say that in all due respect.

Q. Do you know whether or not the Automobile Chamber of Commerce, as it then was, had taken over the defense of the litigation against the Walcott Company? A. Yes, they had.

Q. That is the case of Gordon versus Walcott? A. Yes.

Q. The defense of that case was taken over by the Chamber of Commerce? A. Yes, sir.

* * * * *

(1729) Cross Examination by Mr. Michael.

Q. Mr. McEvoy, my name is Michael, and I am from Milwaukee. You remember me attending one of those meetings, do you not? A. I think I remember you, the first one, I think.

Q. In the summer of 1929? A. Was it 1929?

Q. That was when the meeting was, I think. A. I thought it was after the suit had been brought; 1930.

Q. Well, frankly, I don't have the record of it as to the date of the meeting. A. It would not make any difference. I remember you.

Q. I am sure it was before the depression came along, the crash of 1929, and we had that first meeting. Do you remember having a meeting with representatives of the various automobile companies in 1929? July, 1929? A. I don't think I did.

Q. Would your file show a record of such a meeting? A. It might.

Q. Would you look to see? A. In 1929?

Q. Yes. In July, 1929. A. This stuff I have here doesn't go back of May, 1930. Mr. Arvedson may have had such a meeting. I don't believe I did. I might have.

Q. You don't remember any such meeting? A. No, I don't.

Q. It was held in the General Motors Building. A. I wouldn't dispute that, sir; I just don't recall it.

(1730) Q. You don't remember being at any such meeting? A. No.

Q. You never attended a meeting with representatives of various automobile companies concerning this patent? A. I wouldn't say that either; I just don't recall it.

Q. Did you ever remember attending a meeting of representatives at which there was present a representative of the Ford Company, Mr. Halbert? A. No. What was his name?

Q. Halbert. A. We were not interested in this thing in 1929. We left the matter entirely in the hands of the N. A. C. C. I hadn't even started to do any work on it.

Q. Well, did you attend a meeting in Detroit called by the N. A. C. C.? A. I may have done so. I don't remember it, and I don't believe I did.

Q. And, you don't remember attending a meeting in behalf of General Motors at which there was present a representative of the Ford Company? A. No, sir.

Q. And you don't remember, yourself or any one in your department inviting the Ford Company to attend any meetings of that kind? A. That we would invite the Ford Company?

Q. Yes. A. No, I am sure we didn't.

Q. Well, did you yourself call any meetings? A. No, sir.

Q. Then, of course, you wouldn't have invited the Ford Company? **(1731)** A. I am sure of that.

Q. You don't know whether the N. A. C. C. invited them or not? A. I don't remember, but I don't believe that they did.

Q. And, it was the N. A. C. C. that called these meetings? A. If there was such a meeting, but I don't remember it. About what date was that in 1929, do you think?

Q. Well, there was one meeting at which, according to the evidence in this case, Ford's own records, Mr. Halbert of the Ford Company attended, that was July 9, 1929? A. July 9, 1929?

Q. And, he was instructed when he went there that he shouldn't commit the Ford Company in any way; he was

just going as a listener? A. Well, if there was such a meeting it must have been held at the request of Mr. Arvedson.

Q. But, you don't remember Mr. Halbert being there? A. No, I don't.

Q. Do you know Mr. Halbert? A. No, sir, and I don't believe I was at any such meeting.

Q. Do you remember telling me and the other gentlemen who attended the meeting with you in your office the first time that you were representing the entire industry except Ford, and that Ford refused to come in on it? A. I might have told you that I represented the industry outside of Ford, but I never asked Ford to come in.

Q. And, you don't remember saying that Ford had been invited and refused to come in? A. No.

Q. And that Ford would never settle anything like this anyway? **(1732)** A. Well, I might have told you that last, but I have no recollection of telling you he wouldn't come in. I certainly had no contact with them.

Mr. Farley: Having in mind particularly anything like this.

Q. (By Mr. Michael, continuing): Mr. McEvoy, the agreement that the Gordon Company signed with your company, the settlement of the company, specified the amount of $195,000, is that right? A. That is right.

Q. Now, in addition to that there were a number of other agreements specified in the agreement with General Motors under which the Gordon Company was paid many additional thousands of dollars, isn't that right? A. Yes, that is right. That was Case and White, and Chrysler, wasn't it? And Nash?

Q. And Nash. A. Yes, sir.

Q. So that, in addition to the $195,000, the industry paid those further sums, isn't that true? A. That is correct. That was about $50,000 or $60,000 in all, wasn't it?

Q. I think Chrysler alone was about $50,000. A. Yes, somewhere around there.

Mr. Michael: We are going to produce these contracts, your Honor, and it will all be clear from them.

* * * * *

(1734) Re-Direct Examination by Mr. Farley.

Q. It is right to the point of your Honor's question. Do you have any knowledge, Mr. McEvoy, as to whether or not the settlement figure of $195,000 would have amounted to anything like three-quarters of a cent a cam based on the production of the entire industry? A. I couldn't tell you that, sir, now. I am not sure that that is accurate, because it was changed from time to time as we were getting more information.

The Master: This sheet you were pointing to lists the various companies, and in other columns lists numbers of cams, numbers of cheeks, and the total?

A. That is right, but I wouldn't want to state that is absolutely accurate.

The Master: Who submitted this list to you?

A. Arvedson.

The Master: Is there any way of telling what date this was submitted?

A. No, except by the other papers. It is October 28th.

The Master: Are these papers filed as you received them?

A. Yes. If it is important, I think Mr. Arvedson can give you those figures exactly. I probably can get them from the accounting department.

Mr. Farley: May I see that, Mr. McEvoy, please? (Mr. Farley examining document.)

The Witness (Continuing): It seems to me there was something said at one time about three-quarters of a cent a cam. I don't know whether that was the suggestion of the companies **(1735)** or not. I must have that in the back of my head somewhere. I know in our settlement we didn't consider the number of cams. I didn't know how many cams there were when I made the agreement with Redlin.

Q. (By Mr. Farley, continuing): That sheet to which you were just referring, and which the Master consulted, shows in round figures a total of over 160 million cams and crank cheeks made by the various companies who were included in the settlement, isn't that right? A. Yes.

The Master: Does that agreement purport to be the number in cams and crank cheeks that were turned on the infringing machines?

A. That is right. That might have been revised later. There were several revisions. I remember I reported to the corporation we would have to pay back $30,000 less than we had to. It was very difficult to get these things accurate. There were so many units involved.

* * * * *

(1763) Mr. Farley: I think I will call Mr. Aptekar, if your Honor please, for a few questions.

ALBERT APTEKAR was thereupon recalled as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Farley.

Q. Mr. Aptekar, Mr. Woehrle, I understand, requested you to make some check with reference to the type of tools that were used on the Walcott machine, and the type of tools that were made on the shapers? A. That is right. Mr. Woehrle asked me to look into that, and I checked some of the records, and I found some of the blue-prints on those two different tools that were used; one was for the Walcott lathe, and the other was for the shaper. These are the blue-prints I have; they have a number "Z" number, if you care to record that (producing documents). I don't know whether you had this or not in your record.

Mr. Farley: No, we haven't. I think we will—

A. (Continuing): "A special blade for shaping cams on cam shaft is 9-Z-32" detail 1.

Mr. Farley: I will ask that this drawing, 9-Z-32, the cam shaft tool blade, be marked in evidence as Defendant's Exhibit 293.

(The document above-referred to was thereupon marked Defendant's Exhibit No. 293 by the reporter.)

Mr. Farley: And, the drawing 9-Z-215, as Defendant's Exhibit 294.

(1764) (The document above-referred to was thereupon marked Defendant's Exhibit 294 by the reporter.)

The Witness: Mr. Farley, I wish you would mention those details on there.

Mr. Farley: Very well.

Q. (By Mr. Farley): Now, Exhibit 293 is a drawing for the tool for the cam shaft shaper. This has a date 8/3/21, and the other drawing is dated 5/1/24. These drawings show that as far as the shaper is concerned, the tool is made of hammered high-speed steel, is that right? A. That is right.

Q. And, the same with respect to the drawing for the Walcott machine? A. The same material.

Q. Hammered high-speed steel. All right, now, if you will just proceed. A. The next thing, I had one of each of those tools made up in one of our departments there to show how we maintain those tools—Mr. Woehrle has asked me to get some information as to the original cost of those tools. I was not able to get those. I went through our records and could not find any record at all of those original tools.

Q. Well, you have produced a tool which is made in accordance with the drawing— A. (Interrupting): As per blue-print.

Q. As per blue-print for the shaper. And, you have also produced one for the Walcott machine, which is also made in accordance with the drawings? A. That is right.

(1765) Q. Now, could you tell the Court anything at all about the method of grinding or upkeep on those tools? A. I can. I have not only my own recollection there, I have talked to two men in the shop—in fact, three men there—and they also verified my statement as to how they ground those tools. We had a fixture which held 12 of those tools in there.

Q. You are referring to the shaper tools? A. That is right; Exhibit 293, the blue-print. They were held in a fixture clamped across the fixture, and we went across there with a surface grinder, grinding it with sufficient strength so as to clean off the burnt edge of the tool. Now, this fellow I talked to used to be a foreman on the job there, and his name is William New. He was the foreman

of the grinding room in Highland Park. He remembered it took from 15 to 20 minutes to grind a set of tools, consisting of 12 tools in the set-up; grinding them.

Q. That is the shaper tools? A. That is the shaper tools. I talked to another man by the name of Jack Frost. He was foreman on the opposite shift of this other man, and he told me the actual time of grinding those tools used to take between 12 and 15 minutes to grind 12 tools. That is actual grinding time.

Q. To grind a set of 12 tools for the shapers, is that the idea? A. That is right.

Q. Will you point out to the Court now the difference in the method of grinding that would be required between the tool for the Walcott machine and the tool for the shaper? As I understand **(1766)** it, in re-grinding the shaper tool, the only grinding operation there was was stake grinding across one face of the tool? A. That is right.

Mr. Farley: Is that clear to your Honor?

The Master: This shaper tool, did that cut on the side?

A. Yes. It set in the shaper like this on an angle, about 70 degrees, and it cut like this (indicating).

Now, on these Walcott tools it required the hand operation all the way through. We had to grind this angle in here, this angle in here, and also put the clearance in it to clear the bearing on the cams, and also grind the clearance on the top of the tools, which was about four or five operations, and took those fellows 30 minutes to grind 12 pieces, which was almost double the cost of grinding those tools as they were on the shaper tools.

There is another point I would like to bring out, when these tools got dull, and we had 5/8 of an inch to grind back before we salvage a tool, we used to get 12 to 15 grinds on one of those tools.

The Master: You are speaking of the shaper tool?

A. Yes. On these other tools there very often they would break off and we had to grind all the way back, and sometimes we didn't get any more than about four grinds on those tools, 9-Z-215; that is the Walcott tool.

Mr. Farley: I think that is all. I would like to offer in evidence the two blue-prints of the tools, Ex-

hibits 293 and 294, and also as physical exhibits, the tools 293-A, let us say, which is the shaper tool; and, 294-A, the Walcott tool. **(1767)** I don't think there will be any difficulty about identifying them.

RE-CROSS EXAMINATION by Mr. Spohn.

Q. Mr. Aptekar, as I understand your testimony, this grinding time you have for the shaper tools, that is just what someone else told you? A. My recollection is about the same. I just verified my own recollection.

Q. Did you ever grind any yourself? A. No, I did not, but I used to grind those tools, because it was essential to have enough tools to keep the job running; and, I used to go over to the grinding room to watch them grind those tools.

Q. The shaper tool, as you remember, did they wear pretty uniformly, or wear irregularly, some of them more than others? A. Well, they wore pretty uniform, as I recall it.

Q. Wouldn't the time for grinding them vary very much? A. What they used to do, they would set them up in a fixture. For instance, if the point was burned off a little more, we would set them in a little higher in the fixture. If one is worn down a little, we would set it up a little higher so it would not require any more time to grind that in the surface grinder.

Q. But, they all had to be set up into this fixture before you could do that? A. That is right. We used to use a 12-inch rule, 12-inch scale.

Q. And, they were set up in there? **(1768)** A. That is right.

Q. And, if one was set down lower, of course, they would be grinding a long time— A. (Interrupting): That is why we used the rule, to determine the height of the tools there.

Q. But, if one had been ground a little more than the other, of course, you couldn't set that in the same depth as though that hadn't been ground so much, could you? A. We wouldn't set them too low, because we would have a rule across the top of all these tools, and set them up to that point, where they would strike the tool, and they would be all set within a few thousandths of an inch of the same point.

The Master: If you had one tool on which you needed to grind off more surface, how would you take care of that?

A. We would boost it up a little; move it up higher to take care of that.

The Master: So that you would grind that tool for some time before you would get to the other tool?

A. Not necessarily. In a surface grinder—I suppose you know how they work?

The Master: No, I don't.

A. When you start on a surface grinder you can take off probably an eighth of an inch of stock. It comes across the bottom here, and moves up and down until that is all cut right across the top; so, regardless of how much stock is on there, when you start off at one end you could come right across. You couldn't take off a quarter of an inch of stock, but 10 or 15 thousandths wouldn't make any difference.

Q. But, you had to set these individually, did you not? **(1769)** A. We usually move them up there individually; yes.

Q. Before even you start the grinding? A. That is right.

Re-Cross Examination (Continued) by Mr. Michael.

Q. I don't know that this is going to be very important, but I would like to get it straight for my own satisfaction. A. Yes, sir.

Q. Here is a tool, as I understand, brought in here as a tool out of the Melling machine. It doesn't look like this drawing, Exhibit 294. This is Exhibit 294-A. To begin with, this actual tool, Exhibit 294-A—that would present quite a different grinding problem to the one you had here in the drawing, wouldn't it? A. Mr. Michael, you realize we had to use two of those tools in a set-up, and six of these tools in here to produce our cams.

Q. Is this another exhibit? A. It is the same thing. I just ground one of each to show you the difference.

Q. Is this numbered?

The Master: It was called 294-B.

Mr. Michael: We will call the second tool the witness produced 294-B.

The Master: 294-A has a narrow point on the end of it.

Mr. Michael: Yes; a reduced narrow point.

Mr. Farley: There are the ones taken out of the machine. Does that help (indicating)?

(1770) Mr. Michael: Do we need these in evidence?

Mr. Farley: I don't think so, except this is a full-sized tool.

Mr. Michael: Hadn't you better withdraw these two, then—294-A and 294-B?

The Master: Suppose you do. It will avoid cluttering up the record.

The Witness: They are identically the same tools outside of being a little shorter.

Mr. Farley: I think that is all right.

Mr. Michael: Will you withdraw them on the record?

Mr. Farley: Yes. I will withdraw those so that the record may be clear, and state that the Exhibit 294 is a drawing of the tool which was introduced in evidence as 243.

The Master: Wait a minute. Is it? It is a drawing of another tool.

Mr. Michael: It isn't even that.

Mr. Farley: I think it is.

Mr. Michael: I wouldn't try to say this drawing was of either of those tools. Why don't you just offer those as tools—

The Master: Let the witness explain.

Mr. Michael: What about this other tool, are you going to put this in?

Mr. Farley: It is still in.

Mr. Michael: What is the number of it?

Mr. Farley: Exhibit 244.

Q. (By Mr. Michael, continuing): Now, Mr. Aptekar, we have here Exhibits 243 and 244. Are those like the tools you **(1771)** actually used in the Walcott machine? A. That is right. Those are the actual tools.

Q. And, you used six of Exhibit 244 and 2 of Exhibit 243, is that right? A. That is right.

Q. Now, neither of these tools seem to correspond to the drawing, Exhibit 294? A. As I understand it, we buy those tools outside, and they are made according to this drawing, and we grind those to suit our job as you see on our Exhibits 243 and 244. Mr. Farley, I will ask you to bring my other tool back, because I don't believe this is the tool.

Q. The only difference is that it hasn't teeth on it, is that right? A. This would be in the exhibit, I believe.

The Master: Maybe you better put that other in.

Mr. Farley: Exhibit 294-A still stays in the picture.

The Master: It was 294-B before.

Mr. Michael: Will you straighten it out, Mr. Farley? You can start over again and name that 294-A. You have withdrawn 294-A and 294-B.

Mr. Farley: I don't see any particular point to it, anyway, that we should be cluttering up the record.

The Witness: If I was buying these two tools, I would say I would have to pay more money for this than this (indicating); Exhibit 294, the blue-print, I would say more money for this tool, if I was buying it, than I would Exhibit 244.

(1772) Mr. Farley: Let me have a little examination on this, if you don't mind.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. As far as the tool shown in 294 is concerned, that drawing shows the tools as you did actually buy them? A. That is right.

Q. A piece of practically hammered high-speed steel, 3/8 of an inch square; and, on one side the tool would have— A. (Interrupting): 7 notches.

Q. 7 notches, back from the point; is that the idea? A. That is right.

Q. And the tool as purchased, if the manufacturer followed the drawing, will have a 30-degree clearance angle on the front edge? A. That is right.

Q. As far as the top edge of the tool is concerned, the drawing doesn't show anything at all about rake, does it?

A. No. We would have to grind that ourselves to suit the job, and we found we had to grind it on four different angles in order to produce the proper tool for cutting the cam shaft.

Q. So far as the size of the stock is concerned, the square stock, the tools which you produced show they are made of that size stock? A. That is right.

Q. If we take Exhibit 243, it also shows the same thing? A. Identical same thing.

Q. As far as Exhibit 243 is concerned, that tool, it shows the tool **(1773)** is substantially pretty close to exactly the same length as shown in the blue-print, isn't that correct? A. It is.

Q. It is a little bit shorter, probably 1/16 of an inch shorter of the blue-print size of 2⅝ of an inch? A. That is right. That was evidently ground off in grinding the radiuses on the angles on that tool.

Q. As far as the clearance angle on the front of the tool is concerned, that shows the 30 degrees? A. Just about 30 degrees.

Q. And the size of the tool shows 1, 2, 3, 4, 5 of the notches, and a half of the notch in front has been ground off? A. That is right.

Q. Now, the tool, Exhibit 243, has been ground off on the two sides adjacent to the front edge for the purpose of going into the space to start the cut on the bearings—or, is it at the finish of the cut? A. At the finish of the cut. You will not hit the bearing, the center bearing, and front bearing.

Mr. Farley: Does that straighten it up?

Mr. Michael: That is all right.

Re-Cross Examination by Mr. Michael.

Q. Now, in the use of the Walcott tools, when one of them wore, or became worn, you just take out that one tool, wouldn't you, or adjust the one tool? A. If it burnt out one tool we replace that one tool in particular.

(1774) Q. And, in the shaper, when one tool, or more tools became worn, you would take the whole bunch out? A. No, we take out those tools worn out. If it is one, we take one out; and, if it is three, we take three out.

Q. When you ground them, you ground eight at a time? A. Well, we used to have about 500 tools ahead; when we ground them, we ground 12 at a time.

Q. And those 500 tools were just in a pile in a box? A. No, we had racks to keep them in, aluminum racks with holes in to fit the tools, and we kept them in an upright position with the point upwards so that it would not damage the point of the tool.

Q. Were they kept in the order with reference to the way they were taken out of the machines? A. No. It didn't make any difference what size or length of the tools it was, because our machines were adjustable to the tool.

Q. Some of those might be worn at one thirty-second, or some more, or some less, isn't that true? A. Yes. They would be 15 to 35 thousandths.

Q. But, the variation in that dimension over 500 tools would be much greater than that, wouldn't they? A. I don't hardly think so.

Q. Do you know? A. Unless we strike a hard spot in the cam shaft and we break off the point. They would break off a little more, probably 15 thousandths.

Q. In this fixture you mounted 8 tools? A. No, 12.

Q. 12 in the fixture? **(1775)** A. That is right.

Q. And the distance you would have to grind would be in each case the maximum wear in any one of those 12 tools. I mean, you would have to go up with your grinding as much as the maximum wear on any one of the 12 tools? A. Well, our surface grinders are so equipped you can take off 1/32 as well as you can 5 thousandths. As I explained before, the circular notch of the wheel, starting at one end, you can take off as much stock as you want.

Mr. Farley: May I interrupt? I think you and Mr. Aptekar were talking at cross-purposes there a moment ago when he said the variation of 15 to 35 thousandths. I think what he had in mind was the amount that would be required to be ground at each re-grinding.

The Witness: That is right.

Mr. Farley: But, what you were talking about, I am quite sure, in that 500 tools there might be considerable variation, you might have 1 tool in which 3/8

of an inch has been ground off already, and another was less; is that your idea?

Mr. Michael: No.

Mr. Farley: I am sorry. I thought you were at cross-purposes.

Mr. Michael: I was trying to bring out there was quite a variation in the extent of wear on the ends.

The Witness: There is some variation. There was a 15 to 35 thousandths variation, roughly speaking.

Q. (By Mr. Michael, continuing): As far as the wear extended we will say, it necessitated your grinding, and you ground **(1776)** across the whole face of the tool, didn't you? A. That is right.

Q. The whole end of the tool? A. That is right.

Q. Down to the line where the wear ceased to show? A. That is right.

Q. And, if you had 12 tools mounted in that fixture, you would have to grind to that extent, before you finished the job? Your wheel would have to be fed in or up to that point before you finished the 12 tools? A. Not necessarily. We would send in a box of tools—I don't recall how many in a box—but, I imagine around 50, and the fellow at the grinding machine would sort those out. He would take the ones just worn a little bit, and grind not so much off of those as the ones that were worn more.

Q. Who ground the tools, do you know? Is he still out there? A. Yes, sir, he is.

Q. Who is he? A. One fellow's name is Mr. Jack Frost; he is working now in the clutch department in the motor building.

Mr. Michael: That is all.

Re-Direct Examination by Mr. Farley.

Q. If the man on that tool-grinding job didn't have sense enough as a toolmaker when he was going to start grinding these shaper tools to pick out and sort the ones with the small amount of wear from the ones with the greatest amount of wear, do you think he would stay in the tool room very long? A. I don't think so.

(1777) The Master: What difference would that make if you could adjust it?

A. I don't believe, your Honor, that you quite understand this. Supposing we have this tool run down 1/32 of an inch, and the next tool was only worn out five-thousandths. Supposing this man took the 8 tools out and set them in the grinder. He would take off 1/32 of an inch off of this particular tool. On the other hand, if you had a box of tools of 50, he would look them over in a hurry and set them in the machine, and he sees fit to grind so much off, and then to run along and set the grinder at the back edge of the tool.

The Master: He might use a little extra time, but he wouldn't damage the tools any.

A. That is right. Is that clear enough?

* * * * *

(1781) Mr. Farley: Now, in view of Mr. McEvoy's testimony yesterday afternoon, and Mr. Michael's cross examination of him, and the inferences that might be had from Mr. Michael's cross examination, I am going to suggest this morning that we have a departure from ordinary practice, and I am going to ask your Honor to swear me as a fact witness.

Mr. Michael suggested or, rather, insinuated, by his cross examination of Mr. McEvoy, that the Ford Motor Company had been invited to join this particular settlement. I came here on December 1st, 1929, and have been in charge of the entire patent litigation of the Ford Company since that time; and, it was in 1930 that these negotiations for settlement occurred.

Mr. Michael: I take exception to that, your Honor. They occurred, as far as we were concerned, they were opened in July, 1929. That is when the meeting was had between the manufacturers, and that is when the meeting was had with us.

Mr. Farley: Were you present at the meeting in July, 1929?

Mr. Michael: I was.

Mr. Farley: Very well. That was not according— I refer your Honor to the communications in the record, read into **(1782)** the record by Mr. Cooper, during the cross examination, I am sure, of Mr. Crawford.

I refer to page 319 of Volume I. I don't think it is necessary to again re-read the Exhibit 66, which is

stated on that page. If your Honor wishes to read that at the present time—

The Master: Just a minute, and I will read it.

Mr. Farley: Just for a minute, the letter clearly states, written by Mr. Halbert to Mr. Crawford, that the meeting was held for the purpose of giving all the alleged infringers of the Gordon patent an opportunity of being directly advised by the representatives of the National Automobile Chamber of Commerce, as well as its patent counsel, of the details bearing on the present situation, as well as the opportunity for an exchange of views.

(The Master thereupon examined the communications referred to.)

Mr. Farley: As you are reading that, your Honor please, I would like to call your attention particularly to the top of page 321, which reads:

> "With this in view Mr. Kimball of the Walcott Company made certain suggestions which would give the Walcott Company control of the Gordon patent with some provision whereby the Walcott Company would operate to the advantage of the automobile trade."

The Master: Well, do plaintiffs have any objection to Mr. Farley testifying to what facts he knows?

(1783) Mr. Michael: I don't see that Mr. Farley is in a position to testify as to anything regarding happenings in 1929.

Mr. Farley: I am willing to admit that that is perfectly true, your Honor. I would like, however, to call attention to Mr. McEvoy's statement that it was not until after the bill of complaint was filed in 1930 that General Motors began to have any negotiations with the plaintiffs concerning settlement. And, certainly—let me ask Mr. Michael a question. Will he answer it? Did you not intend, by your cross examination of Mr. McEvoy, to insinuate that the Ford Motor Company had been invited to join this settlement?

Mr. Michael: Which settlement?

Mr. Farley: The settlement you people made with the General Motors Company.

Mr. Michael: I don't know that I said that.

Mr. Farley: Are you willing to admit, Mr. Michael, as far as the plaintiffs were concerned, there was no invitation to the Ford Motor Company to join that settlement?

Mr. Michael: Well, there was invitation to the Ford Motor Company on occasions to settle.

Mr. Farley: On what occasions, sir?

Mr. Michael: In the notice of July 12, 1929.

Mr. Farley: Will you produce the notice of July 12, 1929?

Mr. Michael: It is in the record. And, later a telegram to the Ford Motor Company, which is in evidence here.

Mr. Farley: Very well. That is one of the things I want to testify about. I am perfectly responsible, and I take **(1784)** the entire responsibility for the Ford Company not answering your telegram of November 18, 1930.

Now, there is another point, your Honor please, and this goes directly to the charges that are being made by these plaintiffs here. I would like to refer you to page 305—304 and 305 of the record before Judge Tuttle.

(The Master thereupon examined the pages above-referred to.)

Mr. Farley: I have definitely in mind, your Honor, certain questions of yours and certain questions of Judge Tuttle on the proposition that after the Court of Appeals decided the Walcott machines to be an infringement, as to whether the Ford Company Ford Motor Company was guilty of willful and wanton infringement by continuing to use the Walcott machines for a period of some six or eight months, I think it was—at the most, a matter of months. Mr. Spohn has referred to it as years.

Mr. Spohn: What is the fact? July, 1929, to February 3, 1931.

Mr. Farley: 1930, sir. 1930 the Ford Motor Company started its use of the Pioch machines; not 1931.

Mr. Spohn: But, when did it stop using the Walcotts?

Mr. Farley: As soon as it got sufficient Pioch machines.

Mr. Spohn: That was February 3, 1931.

Mr. Farley: February 3, 1931.

Mr. Spohn: Now, is that years or months?

Mr. Farley: It is months.

Mr. Spohn: It is months.

Mr. Farley: Well, it is a question of mathematics. I **(1785)** wouldn't discuss that or argue about it.

Mr. Farley: I call your attention particularly to page 304 of the record down below:

> "Q. This letter, Mr. Crawford, from the Walcott Machine Company was received by the Ford Motor Company in due course of business after its date, which purports to be July 30, 1929?"

I think we can skip the balance of the colloquy that occurs until we get to the bottom of the page where Mr. Cooper says:

> "I will take an exception, and I will now make an offer to prove, on the point of the last inquiry, that my offer to prove is that when this letter from the Walcott Company states as follows: 'Wish to say that you have no doubt been informed of the plan for the purchase of Gordon and Redlin patent, which will eliminate any cost of damages to the Ford Motor Company.'"

Now, if your Honor please, I was reading over the record last night, and I read in several places statements by Mr. Spohn to the effect that he was urging upon you and this court that punitive damages should be assessed because of the expenses of the accounting.

As the record now stands, and if counsel for the plaintiff are willing to accept my statements as an officer of the court, as to the facts, it is perfectly agreeable to me. If they feel they should have the right to cross examination, I am perfectly willing to be sworn and take the stand and submit to cross examination.

(1786) As to the proposition of the Ford Company not joining this settlement, or not being invited to join this settlement, I know the facts, and the facts are that I have been here since December 1, 1929, and

the settlement with General Motors was effected on October 30, 1930. And, I must state, as an officer of the court, with full knowledge of the facts, that at no time was an invitation given to the Ford Motor Company by General Motors, or by the plaintiffs, to join or indulge in any settlement whatsoever.

The letter to which they refer of July 15, 1929, was the ordinary threat of infringement.

Mr. Michael: And an offer to settle.

Mr. Farley: And an offer to settle upon a perfectly unconscionable sum.

Knowing the facts of this situation as I do, and having in mind—and, I am saying this with great deliberation, your Honor; I am thinking carefully of every word I say—having in mind fully the cross examination by Judge Tuttle of Mr. Crawford, and particularly his remarks to the effect that:

"You say you do not owe these people a penny and you would not now pay them a penny," I will state that as counsel for the company I will still advise the company—I advised the company throughout all of this—and, I am still advising the company that we do not owe these people a penny.

Now, I will admit that that may sound like argument. If, however, counsel for the plaintiffs wish to cross-examine me on that subject, I am perfectly willing to be sworn and take the stand.

Do you wish me to take the stand, gentlemen?

(1787) Mr. Spohn: For what purpose, Mr. Farley?

Mr. Farley: Are you willing to accept my statement?

Mr. Spohn: The statement you advised the company they didn't owe the plaintiff any money?

Mr. Farley: Are you willing to accept my statements that we were not willing to join any settlement? I am going to make the further statement. I offered a settlement to Mr. Gordon. I offered to Mr. Gordon, when he was here in March, 1932—he comes here appearing before this Court, if your Honor please, that he has been oppressed by the Ford Motor Company and driven out of his business.

The Master: Just a minute, I think if you are going to make these statements, as to facts, you should be sworn.

Mr. Farley: I would prefer to.

The Master: Then, the other side gets an opportunity to object to any statements which are not relevant to the inquiry, and also so that they have an opportunity to cross examine. I think I will swear you and take your testimony on the point.

I. Joseph Farley was thereupon called as a witness on behalf of the Defendant herein, and having been first duly sworn, testified as follows:

The Master: Now, you can make your statement in detail.

The Witness: On December 1, 1929, I came to Detroit from New York, and joined the firm of Longley & Middleton, who were counsel for the Ford Motor Company.

I was placed in charge of patent matters, and became **(1788)** patent counsel for the firm, and I have been in charge of the patent matters of that firm, and of the patent litigation of the Ford Motor Company, since that time until the present time.

All of the matters in connection with this present litigation have been handled by me from the time that litigation seemed imminent. I knew of this litigation on the Gordon patent shortly after I came to Detroit, and it was not until a telegram was received by the Ford Motor Company on November 18, 1930, that any proposition or offer for settlement was ever brought to the Ford Company, or submitted to the Ford Company by the plaintiffs, unless it could be said that the notice of infringement received in June or July of 1929 could be considered as an offer for settlement.

I know that a settlement was effected by General Motors Corporation on behalf of the entire industry from which settlement the Ford Motor Company was specifically excluded, and that settlement was made on or about October 30, 1930.

I know that no offer to participate in such settlement was ever made to the Ford Motor Company, nor was the Ford Company ever invited to join such settlement.

I know that, as counsel for the Ford Motor Company, the company receives on an average of 50 to 100 letters a year of the type received from the Gordon Form Lathe Company in June or July of 1929, charging infringement and offering to settle.

The telegram which was introduced here in evidence, which was sent November 18 from the attorneys for the plaintiffs, was immediately called to my attention. By that time I had **(1789)** made sufficient inquiry or study into the Gordon patent to be thoroughly convinced that there could be no common ground or meeting of the minds of the Ford Company with these plaintiffs.

I, therefore, advised the Ford Company that it had, in my opinion, a thorough defense to the charge of infringement, and that, in my opinion, the wisest course to follow was to pay no attention to the telegram referred to.

I think that is all.

The Master: What settlement proposition then did you make in 1932?

The Witness: In 1932, if your Honor please, Mr. Gordon, together with Mr. Sessions, came out to inspect the Pioch machines. I explained to Mr. Gordon at that time that he and his company were, in my view and my knowledge of the law, just simply throwing their money away in attempting to gain any recovery from the Ford Motor Company on his patent, in view of the facts as I knew them.

I was thoroughly conversant with the law relating to accounting; I knew at that time of the decision of the Court of Appeals in the Walcott case.

I felt at that time, and I still feel, that the decision of Judge Simons was absolutely correct in holding the Walcott machine to be a non-infringing machine.

I knew the provisions of the patent law, the entire intent of which is that after an invention is made open to the public, that the public should have the free right to use such invention. I knew that the Walcott machines, which were held by the Court of Appeals to be an infringement, were nothing but **(1790)** the practice of the Blanchard principle, a patent for which was issued by the United States Government in 1819.

I assumed that with the knowledge and information we had, that if we put the Blanchard patent, which was not in evidence in the Walcott case, in evidence that the Court of Appeals, and the Courts, would recognize that principle.

I knew that we had uncovered many items of prior use that had not been before the Court in the Walcott case.

I knew of the Stoddard-Dayton defense. I did not know at that time, however, that valuable evidence concerning the Stoddard-Dayton defense would be put beyond our reach; I thought of Mr. Gordon at that time as a man who was primarily interested in the manufacture and sale of machines, the machining of cam shafts.

I knew that his Gordon machine had proved commercially unsatisfactory and unusable to the Ford Company, as well as to other companies.

We at that time had developed, and had in use, a number of Pioch machines which were far superior not only to the Gordon machine, but also to the Walcott machine which supplanted the Gordon machine. I told Mr. Gordon that he could not hope to recover any money in this case, and I offered him the full and exclusive rights to manufacture and sell the Pioch machines.

That was my offer of settlement.

The Master: Any cross examination.

Mr. Spohn: Your Honor please, in view of counsel's testimony on the matter, we would like a five-minute recess. We don't know whether or not we wish to cross examine counsel. **(1791)** May we have that?

The Master: Yes.

(A recess was thereupon taken.)

The Master: Did the Ford Motor Company ever make any effort to get into the settlement with the members of the National Automobile Chamber of Commerce?

The Witness: We knew nothing about it, your Honor, until after it had been consummated.

The Master: This letter of Halbert's, at least, states there was a discussion of settlement to be negotiated. It hadn't reached any final stage or form at that time, but they were talking about settlement.

Page 321, the second paragraph: "Very little was said regarding the apportionment of costs, in the event that it should be ultimately decided to work out a settlement along the line suggested. There was, however, some indication that in the event of a settlement by way of acquisition of title to the patent, which would necessitate an expenditure of a definite fixed sum, this amount could be apportioned among the various alleged infringers, probably on the basis of their respective outputs."

The Witness: Well, I know nothing about that matter except as I gained it from this letter. I do know, however, that from December 1, 1929, until the suit was brought, nothing ever came to the attention of the Ford Company, or to me as counsel of the company.

I know very definitely that any matter of that type, had it gone to the company, would have been immediately called to my attention.

(1792) The Master: Did you know Mr. Halbert?

The Witness: I knew Mr. Halbert; yes, sir.

The Master: Did he talk over this situation with you?

The Witness: Yes, he did talk over the situation with me, but very briefly.

The Master: Did he not say anything about—

The Witness (Interposing): I will try to recall as well as I can now—I would like to have that question stated.

The Master: Didn't he say anything in his discussions with you as to the fact that this matter was being considered by the Automobile Chamber of Commerce, and that they were trying to work out some plan of settlement?

The Witness: Yes. I do recall now that Halbert and I had some discussions. He told me of having attended a meeting, and this particular meeting, as I recall it now, the way he got into that meeting was through the attorney for one of the other companies—I am not sure whether it was Continental Motors or just which company it was

—who called him up and suggested, or, rather, told him about the meeting, and said although it was primarily a meeting of the attorneys and others who were members of the Automobile Chamber of Commerce, that it would be a good thing for him to come along and hear what was going to be said, that he would gain some valuable information, perhaps, concerning the litigation that they had been through with the Walcott Company; that Mr. Stackpole, who had conducted the defense of the Walcott suit, Mr. Stackpole was a member of the firm of Fish, Richardson & Neave, was going to be present, and would **(1793)** recite all of the facts concerning the Walcott case.

I know that I discussed with Halbert the proposition that the Ford Company was in an altogether different position than any of the members of the Automobile Chamber of Commerce; that we were not a member of the Chamber of Commerce, the Automobile Chamber of Commerce; that in view of the fact that the Automobile Chamber of Commerce had taken over the defense of the Walcott case, that there was no question whatsoever about it, in view of the decision in the Reo Gear Grinding case, that in this circuit, the Sixth Circuit, any automobile company who was a member of the Automobile Chamber of Commerce was definitely in the position that the decision in the Walcott case was res adjudicata against them, and that although additional defense material had been uncovered, none of the members of the Automobile Chamber of Commerce, General Motors, or any of the other companies who had been sued, could be in the position to avail themselves of the additional defense material; and that, therefore, the position of the Ford Company was quite different and distinct.

The Master: You saw this inter-office communication of Halbert's at the time, I presume?

The Witness: No, I wouldn't say that I would, your Honor.

The Master: When did you first see that?

The Witness: I don't think—I know definitely that I did not see that until it was produced at the trial before Judge Tuttle in 1934.

(1794) The Master: Didn't Halbert have a file that he turned over to you in connection with the case?

The Witness: Well, I think you are right, now. I probably am mistaken about that. I probably did. He did have a file, and probably I did see that in the file.

My recollection was that that had not come to my attention until the trial before Judge Tuttle, but I guess I am mistaken in that. There was a file in the office when the telegram was received on November 18, 1930. Mr. Longley handed me that telegram, and then for the first time I got the file of the case out. And, while I haven't any present recollection of having read that communication at that time, I probably did read it. It must be in the file.

The Master: What date did you say this was when you got the file out for the first time?

The Witness: The day the telegram was received, on November 18, 1930. It might have been the 19th, but at any rate Mr. Longley brought the telegram in to me and told me I had better look into the file of the case.

I must say that I don't have any present recollection of having read that communication at that time, or giving any particular thought or attention to it. My present recollection is that as far as that communication is concerned, and the information contained in it, that I first gave any consideration to it when it was produced at the trial before Judge Tuttle.

The Master: Go ahead, Mr. Michael.

(1795) Cross Examination by Mr. Michael.

Q. When did you have this talk with Mr. Halbert, Mr. Farley? A. I couldn't give you a definite date as to when I had a talk about this matter with Mr. Halbert. When I first came out here, I had turned over to me the matter of working up the defenses and looking into the patent situation on the Ferguson Dock patent, a suit which had been filed against the Ford Motor Company shortly before I came. I would say that I devoted my time for the first five or six months that I was out here almost exclusively to the Ferguson case, and from time to time in that period Halbert and I, going to lunch and meeting one another in the office, would discuss various patent matters.

So, it could be any time between December, 1929, and, let us say, the summer of 1930 that I may have talked to Mr. Halbert about this particular case.

Q. But, you think it was before the company received this telegram? A. Oh, definitely before the company received the telegram.

Q. And, did Mr. Halbert tell you at that time that he had attended this meeting with other manufacturers? A. Oh, yes. I knew Halbert had attended that meeting.

Q. Did he tell you that he had attended that meeting on the authorization of Mr. Crawford? A. He told me he had called Crawford and asked Crawford if Crawford would object to him going to the meeting. He told me he had received a call from some of these other attorneys, just which one it was, I am not sure, I think it probably—my present recollection is that he had been called by Mr. (1796) Zewadski of Whittemore's firm, with whom Halbert was rather friendly, and that when he heard from Zewadski about this meeting he called up Mr. Crawford and told Crawford about the meeting, and asked if Crawford would object to his going to it.

I know very definitely that no formal communication was ever received by the Ford Company or Halbert, as attorney for the Ford Company, inviting him to attend the meeting. He got to the meeting, I might say, through the back door.

Q. How do you know there was no formal invitation extended to Mr. Halbert as a representative of the Ford Company to attend the meeting? A. Because if there had been a communication, a formal communication of any type, I am quite sure it would have been in the file of the case, and I know that no such communication was in the files of the case.

Q. Is it your understanding that Mr. Halbert then attended this meeting just as a casual observer, and not on behalf of the Ford Company? A. If you knew Mr. Halbert as well as I did, he was the type of fellow who tried to keep his ear close to the ground and get all the information he could from any source whatsoever concerning any matter he had anything to do with it. It was very characteristic of Halbert, knowing a meeting of that type was to be had, to attempt to be present, and to listen to what was going on.

Q. Well, did he go as a representative of the Ford Company? A. I would say that having called up Mr. Crawford and getting (1797) Crawford's permission to attend the meeting, he certainly was there as a representative of the Ford Company.

Q. And, don't you know that he did so attend the meeting, and had the specific instruction from Mr. Crawford that he, Halbert, was not in any way to commit the Ford Company? A. I don't know that as a matter of personal knowledge, except as I gathered from the hearsay information as contained in this letter, and as Halbert told me about it at the time. Not at that time, because I was not here at that time. This meeting was held on July 8, 1929, in accordance with the information I get from Exhibit 66.

I was in New York on July 8, 1929, and I was in New York until December 1, 1929, when I came to Detroit.

Q. And, you have no personal knowledge of anything that happened prior to December, 1929? A. Well, that is a rather broad statement, Mr. Michael. I have a lot of personal knowledge of things that happened prior to December, 1929.

Q. Well, in respect to this matter we are discussing. A. I would say that, yes, I had personal knowledge of the decision of the Court of Appeals in the Walcott case, and I also had personal knowledge of the decision of the Court of Appeals in the Reo case—I am not quite sure whether that case was prior to December 1, 1929, or not—I think the Reo case was decided in the early part of 1930. I have personal knowledge of those because I make it a practice to read the decisions of the Circuit Court of Appeals and other courts in patent matters as they are handed down. That is the only **(1798)** personal knowledge I had prior to December 1, 1929, of this Walcott litigation.

Q. Did the company, or anyone connected with the company, consult you about this matter at any time after you went with the law firm prior to the receipt of the telegram in November of 1930? A. No. I might say, in answer to that question, Mr. Michael, that it wasn't until the telegram was received that I even knew there was a file in the office of Longley & Middleton having to do with the Gordon patents.

Q. Mr. Farley, have you got Exhibit 72 in the trial below; a paper exhibit that was not reproduced in the record?

(The document was thereupon produced.)

Mr. Michael: That is all, your Honor. But, I think in view of the fact Mr. Farley has taken the stand as

a witness, that all of the statements made prior to his testimony should be stricken from the record regarding this matter.

The Master: Well, I don't know whether some of those statements may not be necessary to be in the record by way of explanation of the reason why he was testifying, or the statement of counsel as to why he wanted to testify. As far as the statements made prior to Mr. Farley's being sworn are concerned, which are statements of fact, those will be disregarded as far as drawing any conclusions from them is concerned.

(Witness excused.)

Mr. Farley: If you will excuse me a minute, your Honor, while I consult this exhibit.

(1799) (Mr. Farley then examined Exhibit 72 of the trial below.)

I would like to now offer in evidence in these proceedings, if your Honor please, the Exhibit 72 that was offered before Judge Tuttle, but which was not reproduced in the record.

The Master: Was it admitted then?

Mr. Farley: It was admitted.

The Master: Is there any necessity for offering it over? As I understand it, we have—

Mr. Farley (Interposing): Well, the only necessity there might be would be that in the consideration of the matter before the Court now, the accounting, this particular batch of correspondence was produced and shown to Judge Tuttle during the trial below. It was not reproduced in the record because of the fact that we felt the situation concerning any charges of willful and wanton infringement had been fully disposed of by Judge Tuttle's opinion.

In view of the decision of the Court of Appeals, and in view of the statements by counsel for plaintiffs here in these proceedings, that they have been urging continually, and apparently intend to continue to urge upon your Honor that the Ford Company was guilty of willful and wanton infringement by using the infringing machines during the period after the decision of the Court of Appeals in the Walcott case, this corre-

spondence is very material right now to the present inquiry.

The Master: May I see it?

(The document was thereupon handed to the Court.)

(1800) Mr. Farley: I would like to not re-offer it. It already has been offered. I would like, however, to submit it to the Court and have you read it right now. You will notice, your Honor please, that the correspondence definitely refers to the patent guarantee of the Walcott Company, or, rather, as contained in the Ford Company's purchase order, and the stand of the Walcott Company in the iterations and reiterations that they were endeavoring to work out some sort of a plan for the purchase of the Gordon patent, and were assuring the Ford Company, until some time well after 1929, that it was their intention to stand behind their patent guarantee and to fully protect the Ford Company in this matter.

I. Joseph Farley thereupon resumed the stand as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified further as follows:

Cross Examination (Continued) by Mr. Michael.

Q. And, isn't it a fact, Mr. Farley, that you, as counsel for the company, relied on that guarantee as excusing the Ford Company for not having anything to do with the settlement? A. No, it is not. I didn't know of that situation until, I would say, after the filing of the bill of complaint in this case.

* * * * *

(1804) The Witness: It was not until after General Motors' settlement that the Ford Company knew that the Walcott Company were not going to stand back of their guarantee, and that the Walcott Company were not going to make any arrangement under their guarantee that would result in the machines at the Ford Company being licensed under the Gordon Patent.

(Witness excused.)

* * * * *

(1810) Mr. Spohn: Your Honor, may we at this time respond to the tender with respect to these contracts?

The Master: Yes.

Mr. Michael: I would like to make a statement in connection with them, your Honor, just to trace the history of this thing a little bit.

On the 12th of April, 1929, the Court of Appeals, Sixth Circuit, decided the Walcott case, holding the patent valid and infringed by the very machines involved in this case. The notice of the infringement from the plaintiff to the entire industry, advising the industry of that decision and containing an offer to settle with anyone who wanted to settle on the terms named in the notice, was sent out on the 12th of July.

The Ford Company received such a notice. It is reproduced here in the record, the original notice to the Ford Company.

The meeting of manufacturers was called by the N. A. C. C.; that is the National Automobile Chamber of Commerce, and they met in the N. A. C. C. offices in the General Motors Building on the 9th of July, 1929. Mr. Halbert's report to the Ford Company—that meeting is in the record, stating, I think, that there were 14 to 18 infringers present at the meeting.

Then, towards the end of July Mr. McEvoy invited the (1811) plaintiff and its counsel to meet with him in his office in the General Motors Building. That meeting was attended and had, and at that meeting an offer by the plaintiff of settlement was made.

In September following, also in 1929, Mr. McEvoy wrote stating that the offer was not acceptable to them.

The Master: I wonder if, since you are stating facts similar to the statements Mr. Farley made, as to whether or not it wouldn't be better to put you under oath, too?

Mr. Michael: All right.

JOHN W. MICHAEL was thereupon called as a witness on behalf of the Plaintiff herein, and having been first duly sworn, testified as follows:

The Master: That will be retroactive to include what you have already stated.

The Witness (Continuing): In September, 1929, as I say, Mr. McEvoy wrote stating that the offer was not acceptable. A number of suits were then filed, and the record of them is in the bill of complaint in this case.

In December, 1929, suits were filed against the Muskegon Motor Specialties Company, Continental Motors Corporation, and the Jackson Motor Shaft Company, and the Hudson Company; and, in February, 1930, suits were filed against the Reo Company, Packard and General Motors. Then, in the summer of 1930 this matter of settlement was reopened, and finally consummated in an agreement which was signed in October, 1930.

(1812) Now, between the notice of infringement, which we sent out following the Court of Appeals' opinion, and the reopening of the settlement negotiations with General Motors in the summer of 1930, settlement agreements were signed with the following companies and in the following amounts:

Chrysler, July 17, 1929, for $46,000.

White—there were two agreements; they have been placed—one of them is in evidence here. The White agreements, one of them was dated December 21, 1929, covering the past, and the other was dated February 6, 1930, covering the future.

The one covering the future was in the amount of $4,000. The one for the past was in the amount of $2,465.92.

Then, there were two agreements signed with the Case Company, both dated February 18, 1930, and one covering the future and one the past.

The future was in the amount of $4,000; the past in the amount of $1,055.28.

Then, there was an agreement with the Nash Company, March 1, 1930, in the amount of $12,000.

These various amounts paid, actually paid, under these settlements, together with $195,000 paid under the General Motors' agreement, made a total of $264,521.20, and under

Section 8 of the General Motors' agreement these sums were guaranteed to the plaintiff, in addition—I mean, the sums under these other agreements which have been made prior to the General Motors' agreement had been guaranteed to the plaintiff, in addition to the amount named in the General **(1813)** Motors agreement.

Just prior to the testimony of Mr. Dahl, Mr. Farley stated at page 743 of the transcript:

> "Q. Are you aware of the fact, Mr. Gordon, that the White Motor Company agreement dated February 6, 1930, contained a paragraph to the effect that neither of the parties to that agreement would use that agreement in connection with any litigation against any other parties based on infringement occurring prior to the date of the agreement?"

Now, I have here in chronological order a complete file of these agreements, all of them. They are executed duplicate originals, including the General Motors' agreement, and all of the others, and amongst these will be found the White agreement that Mr. Farley demanded we produce.

Incidentally, on that I would like to point out all these settlements were produced before Judge Tuttle. They were part of the General Motors' agreement, attached to it; were produced and handed to counsel for the defendant. They offered them. I don't recall now how long they had them, but eventually they came back to us, and Mr. Farley, as I understood his remarks a few days ago, tried to make some point of the fact that they never had the agreements, or when they made up the record they couldn't find them.

There has been no demand on us at any time for them. They were handed back after they had been inspected, and there has been no request for them since then until here in these proceedings.

Of course, defendant in taking appeal to the Court of **(1814)** Appeals had the duty of preparing its own record and its own praecipe, and had they wanted these, they could have had them. However, they are all here at this time.

Now, this reference to the agreement that neither party would use this thing against any other party, or in connection with that, I would like to point out that the first agreement, settlement agreement, was made with Chrysler. It covered the future; the release of all their machines for

future production. In the Chrysler agreement it was recited—this is the fifth section of the Chrysler agreement; I am reading from it:

> "It is further agreed that in the event of litigation—"

remember, this agreement covered the future. They didn't settle for the past on the basis of so much a cam. That was left open. Our offer was to the effect we would settle for either or both; the future or the past. Some took the future; some took both. Chrysler took only the future, and it was quite natural that this section would have been placed in the agreement, and it was.

> "It is further agreed in the event of litigation directed to a recovery for infringement of said patent number so and so prior to April 13, 1929, neither party hereto shall in any wise use this agreement as affecting the measure of damages for such infringement."

Now, obviously, that could only mean in the event we sued Chrysler for the past, that neither of us could use this agreement as the measure of damages for the past. That same provision was carried through every other contract that was made for future settlement, for settlement for the future, both **(1815)** with Case and with Nash, and with White.

All of the agreements are here. The White provision is exactly the same in that respect.

> Mr. Farley: Would you mind reading the White paragraph of the agreement into the record, please?

The Witness: In White it is, likewise, Section 5. I am reading:

> "It is further agreed that in the event of litigation directed to a recovery for infringement of said patent No. 1,542,803 prior to the date hereof, neither party hereto shall in any wise use this agreement as affecting the measure of damages for such infringement."

Now, in connection with the White agreements, I have also included in this file all the correspondence which passed back and forth between the White Company, represented by Mr. Cooper, and ourselves, which shows very clearly that

at first they only wanted an agreement for the future, and that was drawn and sent to them, and they later included, or also settled for the past. And, that fact is also borne out by there being two separate agreements, and the inclusion in the agreement covering the future of this section I have read.

I would like to offer this. I wouldn't say I would like to offer it; I am producing it here, this file containing all these agreements, in response to demand of counsel for the defendant, and I will ask that the entire file, including the agreements and the correspondence with the White Company, be marked for identification as Plaintiff's Exhibit RR.

(The file above-referred to was thereupon marked Plaintiff's Exhibit RR by the reporter.)

(1816) Mr. Michael (Continuing): I will explain in that connection that in making up this file I have included the agreements covering the settlements with the Case Company, and the White Company for past infringement, heretofore offered as Plaintiff's Exhibits GG and FF; and, also, the letter of Mr. Cooper to me dated December 24, 1929, heretofore offered as Plaintiff's Exhibit HH.

The Master: Do you want to examine Mr. Michael on this? (Handing Plaintiff's Exhibit RR to Mr. Farley.)

Mr. Farley: Yes, I do, your Honor, please.

Cross Examination by Mr. Farley.

Q. Mr. Michael, I notice that the fifth paragraph of the agreement with the J. I. Case Company says:

> "It is further agreed that in the event of litigation" —you have already read this paragraph—"neither party hereto"—I have skipped some—"shall in any wise use this agreement as affecting the measure of damages for such infringement."

Now, the agreement with the Case Company referred to a license for future; that agreement referred to only future use of the machines. That is correct, isn't it? A. The longer of the two agreements refers only to the future.

Q. Only to the future. But, the fifth paragraph does contain a provision to the effect that neither party should

use the agreement in any wise as affecting the measure of damages for infringement of the Gordon patent prior to the date of the **(1817)** agreement. That is true, isn't it? A. That is right.

Q. And, the same provision is contained in identically the same language in the fifth paragraph of the White agreement. That is true, also? A. I think so.

Q. Yes. And the White agreement in the ninth paragraph recites:

> "It is mutually understood and agreed by and between the parties that in the event said patent 1,542,803 shall be sold or otherwise disposed of to any person, firm or corporation, for the benefit or in consideration of money furnished by any group of automotive manufacturers, White shall be given an opportunity to join this said group of automotive manufacturers, and to apply any monies paid to Gordon under the terms of this agreement towards the purchase price of said patent; it being understood, however, that in the event White shall elect to so join with such group of manufacturers and have said monies applied to said purchase price, then the license and release herein granted shall be void and of no effect."

Both of those license contracts contained that provision, did they not? A. I think so.

Q. Now, what was the release referred to in this last paragraph? "The license and release herein granted"; didn't that refer to the— A. (Interposing): The release of the machines for future use.

Q. For future use. And, I suppose it would be your testimony that the—or let me ask this; referring to the White **(1818)** agreement, it is dated the 6th day of February, is it not, 1930? A. Yes. I think the correspondence there will explain the discrepancy in dates in those two contracts.

Q. And, the exhibit which you put in, Exhibit GG, a release to the White Company, is dated the 21st day of December, 1929? A. Yes. And, if you will refer to the other agreement you will see that when it was sent it also referred to that same date (indicating), here in Section 1st. In other words, the release was to take effect as of a certain date, which, of course, would have to co-

incide with the date of the agreement for the release of the past.

Q. You make a distinction, then, between the release as to the future and the so-called release as to the past concerning which you had Mr. Gordon to testify that three-quarters of a cent a cam was paid? A. Well, one is the release of the machines for future use; the other is a release for the past.

Q. Well now, at the time the White agreement was signed on the 6th day of February, 1930, the release for past infringement, as exemplified by your Exhibit GG, was in effect, was it not? A. No.

Q. It took effect as of that date, though? A. You can see from the correspondence they were both signed on the same date.

Q. They were both signed on the same date. So, it was at that date, then, at the date you made that agreement, there was a complete settlement in effect between the White Company and the **(1819)** Gordon Form Lathe Company both as to past and to future, was there not? A. When both of those agreements had been signed and delivered, there was a complete settlement.

Q. Yes. And then, as I understood your testimony, your interpretation of the fifth paragraph of this agreement was that it referred only to the use of the agreement in so far as the two parties to the agreement were concerned? A. Well, I am not—I don't think I made an interpretation, Mr. Farley; I think it speaks for itself.

Q. So do I. It speaks very loudly for itself. But, the date this agreement was signed you had fully and entirely released the White Company, not only as to past, but as to future infringement; that is true, isn't it? A. When they were both signed.

Q. Yes, when they were both signed. You just said on the same day, on the 6th of February. A. As far as I know, they were both signed on the same day.

Q. Yes. A. However, they were submitted in the form of two separate and distinct agreements.

Q. Very well. A. And the company had previously elected only to take one of them.

Q. And, at that time you had no claim, when both of these agreements were signed, released both for past and future infringement, you had no further claim against

the White Company? A. When they were drawn we had a claim for both.

(1820) Q. Answer the question, please. I said at the time they were signed you had no claim either for past or future infringement? A. Well, the agreement was drawn up.

Q. Answer the question. A. Separate agreements.

Q. Can't you answer the question yes or no? A. I will answer it my own way. They were submitted separately; one for future and one for past, and the company given its option.

Mr. Farley: Now, if your Honor please—

A. (Continuing): —to take either or both.

Mr. Farley: If your Honor please, I am going to ask—

A. (Interposing): And, naturally, the language of the fifth section would be stated in that way so if they only took the one for the future they wouldn't be bound by anything said in that one.

The Master: It is true—

Mr. Farley (Interposing): Just a minute, your Honor please, I move to strike that answer as not responsive. I think I am entitled to a direct answer to that question. I am going to ask if the Court won't kindly direct the witness to answer the question.

The Master: I will strike the answer and ask you to answer the question directly.

The Witness: What is the question?

(Last question read by the reporter.)

Q. (By Mr. Farley): The answer is "yes," isn't it? A. That is correct.

(1821) Q. So, unless there was a question of future litigation against some third party, this fifth paragraph is meaningless, is it not? Will you answer that directly? A. Not to me it isn't, nor was it to the White Company or its counsel.

Q. I move that the "nor was it to the White Company or its counsel," be stricken. The witness can't know what was in the minds of the White Company nor its counsel.

The Master: I think I will let it stand.

Q. I understand, Mr. Michael, that you have produced here all of the correspondence had between your firm and all of the people with whom you settled concerning the Gordon patent? A. I didn't state that. I said I produced the correspondence between the White Company and ourselves.

Q. These various contracts with the Case Company, and the White Company, were attached to and made a part of the general settlement made with the General Motors Company, isn't that true? A. Correct.

Q. And, they were made a part of that agreement, were they not, with knowledge on behalf of plaintiff, or its counsel, that the monies paid by the Case, the White, and the Nash, and the Chrysler Corporation, would be taken into consideration and an adjustment made by the General Motors and those various companies, isn't that true? A. That is correct.

Q. Now, you produced here testimony tending to show that the White Company has paid the sum of six thousand four hundred odd dollars on the basis of three-quarters of a cent a cam for past, **(1822)** and some $2,000, I think it was, for future use of the Walcott machines. That is true, too, isn't it? A. That is correct.

Q. And you knew at the time you produced that, that there would be, or perhaps should be, some adjustment to the White Company under the general contract with the General Motors Corporation? A. I personally knew nothing about what General Motors did with its various nominees.

Q. Wasn't it your intention, when you produced that contract, Mr. Michael, on the stand, that the Court would get the impression that the sum of $6400 was the full sum paid by the White Company? A. Oh, I think that was the intention and it was the fact.

Q. Whose idea was it, Mr. Michael, that the General Motors' agreement should contain, in paragraph 1 thereof, this language: "Releases and agrees to release General Motors Corporation, a corporation of Delaware, its subsidiaries and nominees (with the specific and sole exception of the Ford Motor Company)"? A. What is your question?

Q. Whose idea was it that the language, "With the specific and sole exception of the Ford Motor Company,"

be included in that contract, if you know? A. Whose idea it was?

Q. Yes. A. Well, the contract was drawn by the General Motors Corporation. We had been given to understand in these negotiations that they were representing the entire industry except Ford, so naturally we insisted that Ford be excepted from this agreement.

(1823) Q. Then, it was placed in there on the insistence of counsel for the plaintiffs? A. Yes. It was placed there very wisely by the General Motors Corporation.

Q. Prior to the telegram of November 18, 1930, you as counsel for the plaintiffs extended no invitation to the Ford Motor Company to enter into the negotiations you were entering into with the General Motors? A. We didn't extend any invitation to anyone to enter into those negotiations.

Q. Answer my question, please. A. We didn't extend any invitation to Ford or anyone else to enter into those negotiations.

Q. You haven't in this file, have you, any correspondence that relates to the settlement you made with the Walcott Company, have you? A. I am not aware of any settlement we made with the Walcott Company.

Q. Were you of counsel for plaintiffs when the decree, Plaintiff's Exhibit 5, was entered in the Walcott case in this court by Judge Simons? A. I was one of plaintiff's counsel.

Q. Was that decree prepared by counsel for the plaintiffs and submitted to the Court for signature? A. It was, after investigation.

Q. And the plaintiff, through its counsel, consented to the entry of that decree in the form in which it is reproduced in Volume III of the record, is that true? A. That is true.

(1824) Q. Were you counsel throughout the trial of the Walcott case, Mr. Michael? A. I was one of counsel.

Q. Did you at any time during the Walcott case consider what your claim for lawful damages, or your claim for damages under the law against the Walcott Company, might be? A. Not that I know of. It usually takes a long time in these patent matters to determine what damages or what profits there may be.

* * * * *

Q. (By Mr. Farley): Did you prepare any formal bill of costs in the Walcott case? A. I don't think there was any formal bill of costs filed in the case, but we checked our costs quite carefully at the time, and I think they ran quite in excess of that figure of $4,000.

Q. Do you know whether or not, Mr. Michael, after the general agreement was made with the General Motors, that General Motors under the terms of that agreement issued licenses to other members of the Automobile Chamber of Commerce including the **(1825)** White Company and the Case Company? A. I know nothing about that, or knew nothing about it until, I think, Mr. Dahl or somebody pointed out that the license had been issued to them, to the White Company.

Mr. Farley: I think that is all.

(Witness excused.)

* * * * *

(1826) NORMAN R. SCOVILL was thereupon recalled as a witness on behalf of the Defendant herein, and having been previously sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Farley.

Q. You are the same Mr. Scovill who testified here before? A. Yes, sir.

Q. You are employed by the Ford Company, and as you testified before, have charge of all forms of the company? A. Correct.

Q. As a part of your duties, you testified here before you not only prepare the forms, but you give the orders, and you have a set of instructions concerning the length of time through which, or to which, various forms shall be preserved, is that right? A. Yes, sir.

Q. What are your orders, and what is the practice with respect to cost summary cards at the Ford Company? A. That is in the holding of records?

Q. Yes. **(1827)** A. The order is that we do not destroy any records pertaining to cost.

Q. That would apply, then, to the cost summary cards— A. (Interrupting): Yes, sir.

Q. (Continuing): —of the— A. (Interrupting): 3566.

Q. (Continuing): —of the type shown in these exhibits, D, E, E-1 and through F to F-13, is that correct? A. That is correct.

Q. Now, are you familiar with the type of purchase order used by the Ford Company in the years 1922 and 1924? A. Yes, sir.

Q. Can you produce one of those forms? A. I have one right here in my hand (producing document).

Mr. Farley: I will ask that this set of forms be marked as Defendant's Exhibit 296.

(The set of forms above-referred to was thereupon marked Defendant's Exhibit 296 by the reporter.)

Mr. Michael: How about 295?

Mr. Farley: I will straighten that out right now. I will ask that the letter dated February 1, 1939, addressed to me or, rather, addressed to my firm, and signed by Mr. Pioch, be marked Exhibit 295.

(The document above-referred to was thereupon marked Defendant's Exhibit 295 by the reporter.)

Q. (By Mr. Farley, continuing): Now, I notice that this set of forms as produced by you consists of a number of sheets. Will you explain to the Court the way in which the purchase (1828) orders are used, if you know? A. The original copy is sent to the vendor.

Q. That is the first sheet? A. That is the first sheet. Attached to the first sheet original is an acknowledgment of order, which is signed by the vendor and returned to the company acknowledging the order, and the conditions thereon.

The No. 2 copy is the Ford Motor Company copy, which also has the conditions, same conditions, as printed on the original, and this copy is kept in file and also ties up with the signed acknowledgment.

The third copy is used as a follow-up copy by the production department.

The fourth copy is, also, a numerical file copy, which is filed by the purchasing department.

The fifth copy is directed to the cost accounting department.

The sixth copy directed to the receiving department, notice of shipment.

The seventh copy is not always used unless purchases are made through the Walkerville plant in Canada.

The eighth copy is the invoice record, which record all invoices are applied against.

Q. Now, I notice that the first copy contains certain clauses and conditions; whereas, some of the other copies are blank with respect to the reproduction thereon of the conditions as printed on the first copy? A. Correct.

Mr. Farley: I will offer the set of forms as Defendant's **(1829)** Exhibit 296.

Mr. Spohn: May I ask counsel what the purpose of the offer is?

Mr. Farley: Yes; to establish the patent guarantee clause and to prove by a later witness that the orders sent to the Motch and Merryweather Company ordering the Gordon machine and the Walcott machine, the original form, and the first copy, is a copy that is no longer in the possession of the Ford Motor Company.

Mr. Spohn: Your Honor please, we object to the offer as not material and relevant to anything we have in this lawsuit.

The Master: Where is the first copy of the purchase order?

Mr. Farley: The first copy of the purchase order goes to and was sent to, in each instant, to the supplier. In connection with the first copy of the orders of the Motch and Merryweather Company, I was trying to find the place in the record, if there is any question to be raised concerning this being secondary evidence. But, if my memory serves me right, Mr. Gordon somewheres, in either the proceedings before Judge Tuttle, or here, was asked the question as to whether or not he had not procured from the Motch and Merryweather Company their entire file relating to the sale or attempted sale of the Gordon machine to the Ford Company. My recollection is that he said that he had, and that file was in Milwaukee. I wonder if we might ask Mr. Gordon now whether you still have that file, Mr. Gordon?

(1830) Mr. Gordon: I believe we still have it.

Mr. Farley: Will you produce from that file the original purchase order received by the Motch and Merryweather Company from the Ford Company ordering the Gordon lathe?

Mr. Spohn: We will produce anything we have, your Honor. If the file is in Milwaukee we will have to go to the file to get it. We can't produce it now. But, we do want to object to its relevancy and materiality even upon its own production.

The Master: Well, I haven't thought through all the legal implications of the argument that Mr. Farley has advanced in connection with the introduction of these exhibits. I think I will permit them to go into evidence; that is, when the original exhibit or original purchase order is produced, and leave it for legal argument as to whether there is any validity to his contention there. However, I think this being secondary evidence, and Mr. Gordon having agreed to produce the original primary evidence, if it is in the file, we should withhold the admission of this exhibit at the present time.

Mr. Farley: If your Honor please, it is my purpose to offer this, too, in connection with the order given to the Walcott Company. The only copies we have in our files of these two orders are copies that are blank, which do not contain the patent guarantee clause. You may recall when Mr. Broughton was here, he testified that he could find nothing in his files or the Walcott Company's files, as I recall it, concerning the matters before us here. I don't know; **(1831)** I don't recall offhand whether his testimony went to the original purchase order of the Ford Company, as he was examined here chiefly on the subject of this order for shapers.

I do recall, however, that I requested Mr. Broughton to furnish me with the original purchase order and he advised me that he was unable to find it. I can recall him as a witness for that purpose.

The Master: Are you speaking of the shapers now?

Mr. Farley: No, sir. I am speaking of the orders for the Walcott lathes that were marked here in evidence Exhibits 217, 218, 219 and 220. They are duplicate originals of a set of purchasing orders of which

the one you have in your hand is a copy. Here, Exhibit 221 and Exhibit 222 are duplicate originals of the six machines that were ordered in 1929, and the duplicate original of the order to the Motch and Merryweather Machinery Company ordering the Gordon machine, which is dated August 2, 1922, is reproduced in Volume III of the book of exhibits at page 1043 as Defendant's Exhibit 56.

Mr. Spohn: Mr. Farley, have you got Defendant's Exhibit 54 with you? Isn't that what you are talking about?

Mr. Farley: No. That is a machinery requisition. Exhibit 56 is the one I have reference to. This has the reporter's stamp on it.

Mr. Michael: Isn't this what you want us to produce?

Mr. Farley: Yes. That is the original of that. Of course, if counsel will agree that the Gordon Form Lathe Company received from the Ford Motor Company a regular purchase **(1832)** order containing the patent guarantee which we are talking about, I think there will be no necessity for the production of the original.

Mr. Spohn: I think we better look it up, Mr. Farley. We will produce what we have.

The Master: With regard to the Walcott Company—

Mr. Farley: (Interposing): I notice that that was probably, I might say, perhaps an inadvertency in the trial before Judge Tuttle. There was a reference made by, I am quite sure, by both Mr. Weibel and Mr. Crawford in their testimony to the patent guarantee and the purchase orders, but the purchase order, or the exact clause of the patent guarantee, was not placed in the record except by the reproduction of it in one of those letters forming a part of Exhibit 72 which I just handed to you this morning.

The Master: Yes. I noticed statements to the effect there was such a guarantee clause and there was no denial, apparently, in the replies of the Walcott Company.

Do you have an objection on the basis of the best evidence rule to the reception of this exhibit in so far

as it applies to the Walcott Company, and the contract of the Ford Motor Company with Walcott Company on the purchase of the machine?

Mr. Michael: In so far as it applies to the Walcott Company?

The Master: Yes.

Mr. Michael: No, I haven't any objection.

Mr. Spohn: That is with reference to the best evidence **(1833)** rule. We still have the objection as to the relevancy and materiality.

The Master: You will admit there was such a guarantee clause?

Mr. Spohn: If the witness testified there was such a thing on it.

The Master: The witness hasn't testified directly as to the Walcott Company. He said all purchase orders had this clause in them at that time.

Mr. Farley: I might state there; perhaps we might shorten and save a little time. Mr. Scovill, I don't think, would be in a position to state unqualifiedly that the orders which were sent to the Motch and Merryweather, and the Walcott Company, were made on this form. His knowledge, I think, would be limited to the fact that this is a form of the company and—as far as you are concerned, would you say, Mr. Scovill, all purchase orders which go from the company are sent out on such forms?

The Witness: Yes, sir.

The Master: Do you know whether that was so in the period, say, from 1923 on to the present date?

The Witness: Yes, sir.

Mr. Farley: I might state there, your Honor please, it was my purpose to recall Mr. Weibel this afternoon for a few minutes as he was in charge of the particular department, and have him state that such orders were always used and—

The Master: I think Mr. Weibel did so state in his testimony, did he not?

(1834) Mr. Farley: I think so. I think it really is not necessary in view of the facts to take any more of Mr. Weibel's time in the matter, although I am perfectly willing to have him do so and have him so testify.

If counsel will stipulate or agree to my dictating a stipulation that if Mr. Weibel were called he would testify that the Form, of which a copy is put in evidence as Exhibit 296, was regularly employed in his department, and he knows that the orders to the Motch and Merryweather Machinery Company, ordering a Gordon machine; also, to the orders of the Walcott Company, ordering Walcott lathes, were sent out on a purchase order of the type shown in Exhibit 296, containing the patent guarantee clause as one of the conditions—

Mr. Spohn: Of course, if your Honor please, we have no objection to this exhibit on the ground of it being secondary evidence. The fact is, however, this witness doesn't know the facts as they were back in 1922. Isn't that so?

A. Well, I feel my statement is quite sure because of the fact these particular orders have been going through my hands for the past 15 years, and I know, in disposing of a lot of records in 1931, that this particular kind of order was destroyed; that is, for years back there wasn't any set time, the number of years back, for holding forms as there is today. And, I recall that the conditions were identical with the conditions that are on that order.

Mr. Spohn: Has there been any change in this form in the last 15 years?

A. Any change?

(1835) Mr. Spohn: Yes, in Exhibit 296.

A. Yes, there have been a few changes.

Q. (By Mr. Farley, continuing): How recently, or what date, Mr. Scovill? A. Well, to be exact, knowing that has always been an important factor on that form, about—well, a new change would be when the processing tax come into the picture. We, of course, put in an exemption on certain forms where we had no tax to pay. That, I think, would be about three or four years ago, and the only other change that I know on that is a slight change in the freight conditions. Other than that, I don't know of any changes. I can't remember of any changes going through.

Q. Is it your recollection that the patent clause has been retained without change throughout all of the years

that those purchase orders have been used by the company? A. Of the 15 years that I have been right close to that job, there have been no changes to the patent clause.

* * * * *

(1842) (Witness excused.)

Mr. Farley: I would like now, if your Honor please, at this time to offer Exhibit 295 in evidence with the stipulation concerning which I discussed the matter last night with Mr. Spohn, that this is a letter prepared by Mr. Pioch from the same data and in the same manner as he prepared Exhibit No. 264.

This is a computation of the same type, and if Mr. Pioch were produced as a witness he would testify that the material on Exhibit 295 was compiled by the same sort of computation as made by him, and about which he testified concerning Exhibit 264.

Mr. Spohn: Mr. Farley, the purpose of the offer of 295 is what? To show the use of the shaper on the tractor F-446?

Mr. Farley: Well, for the purpose of computation in the **(1843)** standard of comparison of the shaper to Walcott machines.

Mr. Spohn: But, it relates to the use of the shaper on tractor shafts.

Mr. Farley: On tractor shafts, yes.

Mr. Spohn: Your Honor please, the stipulation with respect to what the witness would testify, we expect he would testify in accordance with the terms of this letter but we, however, object to the receipt of the letter on the grounds there is no relevancy and materiality here in respect to the use of the shaper as a standard of comparison on tractor F-446.

The Master: Well, that is all based on the question of what is the proper standard of comparison, and I am not deciding that now, so I will admit the exhibit in evidence. The speed of operation on the machine in terms of the time sliding back and forth is the same, is it not?

Mr. Farley: That is right.

The Master: All this brings out is how that will affect the cutting speed of the tool, and—

Mr. Farley: (Interposing): And, also it gives the relative time for the cam to complete one revolution due to the greater perimeter or circumference, if it could be called that, of the model F cam, as compared with the model T cam.

The Master: The surface speed of the tool on the model T, in accordance with Mr. Pioch's computation, is 34 feet per minute average, and the surface speed on the tractor is 38 feet per minute, and there is a pencil notation, I believe, under Mr. Pioch's initials, "This speed is O.K.; not too fast."

Mr. Farley: That is right.

(1844) The Master: In view of Mr. Brush's testimony that the limiting factor in the use of the shaper is not the speed of the tool at all, or the speed of the cutting, how is that particular point important? In other words, with the computation Mr. Pioch has made for the tractor here, the acceleration and deceleration or loss in motion, of the machine, would be more rapid than with the shaper as applied to the machining of the model T cams, because the tractor cam shaft being longer, the longer stroke would be necessary.

Mr. Farley: Why, I don't think that the slight difference would be of any particular importance, but even on that, remembering Mr. Brush's testimony, and that particularly with respect to exhibits, I think, 268 and 269, the drawing Oberhoffen's plan for designing the shaper to cut the model F shafts, you will recall there the speed of the two strokes was to be made uniform. And, as far as the reversal is concerned, the speed of reversal in the machine was the limiting factor where you reversed the table for return stroke at twice the speed of the cutting stroke.

The Master: Well, this computation here is based on the same type of movement as you had on a model T shaper. It says, "Cutting stroke, 240 degrees; return stroke, 120 degrees." Then, if in the original model T shaper the maximum speed had been built into the machine from the standpoint of the maximum speed possible, because of the strain on the machine, because of the reversal of motion, then it would be above the maximum practical speed with the **(1845)** same type of machine for the tractor.

Mr. Farley: If your Honor please, that is a matter I would prefer to handle, if I may, by the testimony of Mr. Oberhoffen on the subject.

The Master: All right. I just mentioned it.

Mr. Farley: The fact of the matter is, I asked Mr. Pioch over the telephone yesterday morning to prepare a computation for the model T, and tractor in the same manner as he prepared it for the model A. As far as we were concerned, we were not particularly interested in this cutting speed in feet per minute, but the computation on this Exhibit 295 was made to include all of the figures which Mr. Pioch had included in Exhibit 264.

* * * * *

(1854) HAROLD M. WOEHRLE was thereupon recalled as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Farley.

* * * * *

(1855) Q. You have been present, Mr. Woehrle, during the taking of all of the testimony here since January 15 of this year? A. I have with the exception of yesterday.

Q. Now, have you made any re-computations based on the facts as established by the testimony of the various witnesses? A. I have.

Q. As you appeared here in March mainly for the purpose of cross examination, and we now are on the defendant's case, I wish you would outline to the Court, first, the instructions under which you started this particular work, and the methods you employed generally in order to ascertain the facts upon which your various computations have been based? A. Well, I can first make the statement—when I refer to "we," I mean Mr. Russell and myself, because Mr. Russell has also been working with me, at least being my adviser all the way through. As I recall it, we were called over to Mr. Farley's office on October 31, 1937, and were, both Mr. Russell and myself, were called over, and we were there informed of the general outline of the case and it had **(1856)** progressed so far, and were shown a

list of questions to be answered, a list of questions dated October 29, prepared by the Master, directing us to procure certain additional information.

Mr. Farley gave us the names of various individuals whom he had already contacted, principally Mr. Shawkey and Mr. Hovis. The next morning, November 1st I believe it was, Mr. Russell and I went out to see Mr. Hovis, talked over to see what he had previously—what ground he had previously covered.

Having obtained that information, Mr. Russell returned to the office and I called Mr. Shawkey. Mr. Shawkey turned over to me at our first meeting Spencer Libby's notebook, marked Exhibit—a copy of which is marked Exhibit 13, attached to our further statement of account, and Mr. Marentette's time study. I think I will call them operation sheets in order to make it understandable. I will define an operation sheet later on.

Q. Just at that point, Mr. Woehrle, were you given any instructions by me as to the nature of the report which you should prepare, or how you should go about preparing it? A. No. As I remember, you showed me your exhibit which you had already filed, Exhibit A, and I looked that over, but didn't accept any of the facts that you had placed in there, and was told by you to go out and start afresh. In other words, start right from scratch.

Therefore, I accepted nothing in that first exhibit, and started from the ground up, so to speak. As I remember (1857) it, you told me what you were after were the facts, regardless of what they were, and all you were interested in was getting the true picture of the situation as you knew it existed, but had so far been unable to ferret out. And, knowing the organization out there as I do, you figured I could probably contact the persons from whom I could, perhaps, obtain the correct information. So, with that thought in mind, I disregarded your first statement of account entirely. In fact, you will see no similarity between your statement and the later statement which we filed under Exhibit C. There are few facts contained in the original report which we used, and the ones we did use, we verified, personally, or through records.

Q. Well, can you proceed to outline, then, the procedure followed by you, taking the matter up where you left out with your obtaining from Mr. Shawkey the Libby

notebook and the Marentette time study or operation sheet; the Marentette operation sheet being the one that was introduced and attached to your statement of account, as Exhibit 14. That is correct, isn't it? A. That is right.

Q. And, the Libby notebook attached to your statement of account, Exhibit C, and marked Exhibit 13? A. That is right. That Exhibit 13 is a copy, a typed copy, taken from the information contained in Mr. Libby's notebook.

With those two operation studies, I prepared a tabulation, and it took me several days before I had all the information I needed on those.

Then, Mr. Shawkey conducted me around the plant for three **(1858)** or four days, acquainting me with certain individuals in the plant. Thereafter I went on my own, so to speak, and that is when I had most of these interviews with the men mentioned in the record so far.

Q. Now, what other records of the Ford Company did you use in addition to Exhibits 13 and 14? A. Are you referring now to my first statement of account? You are, I assume?

Q. Yes. A. Before we have any amendments, any additional records?

Q. Yes. A. Besides these two Exhibits, 13 and 14, there were numerous cost summary cards, and minute cost summaries, production labor schedules, and overhead percentage schedules; various other data such as motor numbers, and service sales' records used in the compilation of production figures.

Q. Now, the cost summary cards you refer to, where were they obtained by you? A. I obtained some of them from Mr. Hovis, who had previously taken them from the files at Highland Park. I obtained the remainder of them by going over to Highland Park myself and contacting the custodian, Mr. Ray Lively.

Q. And, the cost summary cards which you employed in your computations, are the ones which have been introduced in evidence as Exhibits D, E, E-1 and F to F-13, is that correct? A. I believe so, yes. Other records which were used in our computations were the machinery valuation records prepared in the cost department, accounting department, about which **(1859)** Mr. Missal testified just

the other day; similar records prepared by the engineering department called "Inventory of Machine Tools," and I believe those are Exhibits Y-1 to 24 in the case.

Q. That is right. The valuation records are Y-25—
A. (Interposing): Y-25 to 48.

Q. That is right. A. I believe those are for the Melling cam lathe. Then, of course, we have similar records for the Ford cam shapers and the Pioch cam mills, and the Reed Prentice lathe, which was used in the construction of the Westinghouse adapted lathe.

The Master: With regard to the Ford shapers and the Westinghouse machines, what information and instructions did you have from Mr. Farley as to the use of standards of comparison in connection with patent accounts?

A. Well, naturally, being an accountant, I relied on Mr. Farley's suggestions as to the standards of comparison. He advised that the Westinghouse would be a proper standard, and I used that, assuming he would establish the standard in his argument.

On the shaper, our first occasion we had to talk about that was after I had interviewed Mr. Pioch on November 8th. Speaking about that, I would like to refer to the record where I made that reference before, on page 174, Mr. Spohn asked the question—

The Master: This is page 174 of what proceedings?

A. Page 174 of the proceedings of March 17. Mr. Spohn asked this question: "Q. And from whom did you obtain the information **(1860)** that the model A would have been machined on the Ford cam shaper?" And, I answered: "Mr. Pioch."

Mr. Farley: I think the record was corrected there to change "would" to "could." It is on my copy.

A. Then, on page 175 the question is:

"Q. Do you have any notes as to your conversation with him?" And, my answer is, or was, "Yes." Thereupon, Mr. Spohn withdrew the question.

Then, on page 190, Mr. Farley asked this question, middle of the page:

"Q. May I see your statement from your interview with Mr. Pioch?"

I answered, "Offhand, I am not familiar where that is filed."

I wish to produce that, at least get into the record my interview with Mr. Pioch.

(1861) A. (Continuing): I have before me my work sheet which is dated November 8, 1937, which is just eight days after I started on the case, and as a result of my conversation with Mr. Pioch I wrote this:

> "Mr. Pioch stated that in his opinion the old cam shaper in use prior to 1925 could have been adapted for use in making Model A cam shafts without requiring an additional operation or an additional time for the shaping operation. He further advised that he could make a design to substantiate his theory.
>
> "With that information at hand I went to Mr. Farley and asked him if that would be a proper standard of comparison, and, I believe, after a short while, you said go ahead and use it. So that is where I got the shaper idea."

Q. (By Mr. Farley): And at the first talk you had with Mr. Pioch, he did not have any drawings of anything of that kind to submit to you at that time showing his conception of the shaper that he then mentioned to you? A. He did not.

Q. And are you aware of the fact that I then got in touch with Mr. Pioch and told him to make up the necessary drawings to show the ideas that he had then in mind? A. I was aware of it, yes.

Q. Now, will you proceed? A. That takes care of our standard of comparison for the A shaft, on the shaper, and, since the T shaft had already been used—I mean the shaper had been used—on the T shaft, that was **(1862)** the natural comparison to use, and the Westinghouse there was the additional standard for the A, Model A shaft, and, I took Mr. Farley's word for that without any re-checking with anyone.

Q. Now, do you recall my stating to you before you made any computations and before Mr. Pioch made any drawings that the shapers could, in my opinion, be used without any modification but a slight change in the shaft?

A. Well, that is hard to say. I know we had that brought up in our conversations. I don't remember whether it was before or after this date.

* * * * *

(1878) Q. (By Mr. Farley, continuing): Now, you have produced some additional computations. I wonder if there is any further explanation you had to make about anything before starting in to discuss the new computations you have here? A. No, I don't remember anything now.

Q. Well, now, let's see.

Mr. Farley: I will ask that be marked Exhibit C'.

The Master: Well, you could mark it Exhibit D. This discussion is off the record.

(There was a discussion off the record.)

The Master: Well, suppose you mark that Exhibit C'.

(Exhibit No. C' was then marked by the reporter.)

A. Well, these are meant to be substitute pages, and they are marked on the bottom of the sheet.

Q. (By Mr. Farley): Now, then, I notice your first page of this exhibit is marked sheet 8? A. That is right.

Q. Now, do I understand that sheet 1, sheet 2—the first 7 sheets of Exhibit C, as originally filed are to remain unchanged? **(1879)** A. That is right. Because that pertains primarily to the computations on the Model T-410 shaft, and I did not change that computation.

Q. That computation being based on your records of the Spencer-Libby time study obtained from the Spencer-Libby notebook and also Exhibit 14? A. Yes.

Q. Exhibits 13 and 14? A. Exhibits 13 and 14, yes, which are attached to Exhibits, attached to Exhibit C.

Q. Well, now, will you take up your Exhibit C' and make whatever explanations of it you think necessary? A. By referring to page 8, you will notice that the only figures in the body of the schedule which are changed are for direct labor and the amounts changed from $105,531.36 for direct labor on the cam shaper, to $86,921.15. That is on the C' schedule. And that the 120,000 odd dollars on the direct labor for the Melling cam lathes is changed to $101, odd, on the new exhibit, C'.

Q. $101,000, isn't it? A. $101,000, odd dollars, that is right.

Q. The other figures for depreciation, I note, remain unchanged? A. Depreciation and maintenance repairs remain unchanged. By changing the direct labor, you will notice that the loss has been reduced from $31,045.25 to $30,697.91; and, correspondingly, cost per shaft has been reduced for the cam shaper comparison from .0385 to .0341, and, on the Melling cam lathe, the cost has been reduced from .0458 to .0413.

(1880) Q. Now, just a minute on that. What sheet are you referring to? A. Page 8.

Mr. Farley: Off the record.

(There was a discussion off the record.)

A. I might explain the reason for the differences now. The direct labor difference on the Melling cam lathes arises from the fact that we have used the so-called Autostroy operation sheet, which is a Ford Motor Company record, by the way, that is, Exhibit 18, attached to this Exhibit C'.

Mr. Farley: Now, I was wondering, before you go into your further explanation of that, if we might have a few minutes' recess.

The Master: All right.

(Short recess taken.)

The Master: All right, you may proceed, if you are ready.

Q. (By Mr. Farley, continuing): Will you proceed now, Mr. Woehrle? A. I believe we got down to the point for the reason of the change that is on this Autostroy operation sheet, Exhibit 18. I would like to call your attention to operation 12, straightened by hand press, 100 per hour. Now, that is one man operating one hand press, and 100 an hour into 60 minutes, gives you .60 minutes for the straightening operation. That operation 13, turn cam on Melling cam lathe, that is 30 an hour for one man operating one machine. He operated two, and, I understand he always did. That would be 60 an hour. 60 an hour into 60 minutes gives you one minute for the man time; and that total of 1.60 minutes, if you will refer to page 9 of the Exhibit C' to **(1881)** the third column from the right, in the heading it says, hours required for two operations, produc-

tion multiplied, 1.60 minutes, or by .0266667 hours. That is nothing more or less than converting the minutes into hours, because we have got the hourly direct labor rates.

Now, if you will convert the production in column one —production of the Model A shafts—into hours at .02 and so forth hours, you will get the result for column number five.

That will give you the total number of hours which were consumed in these two operations, straightening and turning on the Melling cam lathe.

Q. Now, in connection with that method of calculation, do you recall my questions of Mr. Moise on cross examination, where, at least, it was my understanding of his answer was, that an accountant would not take two operations that way and multiply them by the production. As I understood his criticism, it was based on the—or his objection to that method of figuring was that instead of multiplying the production as you had done it here, it should be done by multiplying first by the one minute and then by the .60 minutes and then adding the two figures. A. Well, that would give you the same result.

I don't know what Mr. Moise had in mind when he testified. From my standpoint I can't see any criticism of adding a straightening and a turning operation together, because what I am after is the total time it takes to put the shaft through these two operations. Well, it takes 1.60 minutes. Well, now, a laborer, a man has to be on the job all the time while that **(1882)** is in process. These are man minutes. In other words, man minutes per shaft.

Now, it doesn't make any difference whether you first compute it on .60 minutes and the one minute, and add the two together. There is no mathematical confusion there. I can't understand why that isn't the correct method to use.

Q. It would make no difference in the net result, obviously. A. No, it doesn't make any difference.

Here is one thing that maybe Mr. Moise had in mind: He might have had in mind that the base rate of, base rate of pay of these operators, the operating of the straightening and the turning on the Melling cam lathe. However, that isn't the case. The men in this department were on the same hourly rate. In fact, they could be switched from one operation to the other. So, with that information at hand,

there is no criticism, as far as I can see, in adding the two together, and then multiply by the average labor rate.

Q. All right, now, proceed. A. Well, take the column 5 and multiply each figure there in the column opposite each month by the average direct labor rate in the department 410 for that corresponding month.

Q. As contained in column No. 6? A. Column No. 6 are the direct labor rates.

Q. Yes. A. Averages.

Q. Yes. A. Month by month for November, 1927, to February.

Q. And multiply—and the multiplication of the figures in column **(1883)** 5 by the figures in column 6, then, that would give you the direct labor cost of the two operations as contained in the last column at the right-hand side of the sheet? A. That is right. And the total of that cost for the two operations is $101,108.05.

Q. Now, on that sheet, gives you, in that column, then, the last column, the direct labor cost on the Melling cam lathes, and included the straightening operation for the production of Model A-6250 shafts from the period from November 1, 1927 to February 3, 1931? A. That is right. And that is carried forward to the summary on page 8.

Q. Well, now, as I understand your computations and your schedule, no change—has any change been made as to the other figures on the page? A. Yes.

Q. What? A. The figure in column 3, the figures in column 3, the heading, hours required for two operations production multiplied by 1.3755 minutes, or by .022925 hours, that column has been changed, due to the fact that we have found, or have used more definite facts than we had in the first computation.

I would like to refer to page 23, where we have the explanation, description of means and methods used in computing schedule II—that is, Roman numeral two.

I have already covered the Melling computation there. On page 24—it reads as follows:

> "In comparing the operations required if Ford cam shapers **(1884)** had been used, it appears that as no straightening operation was required for shaping the Model T-410 cam shaft, none would be required for the A-6250 cam shaft. Hence, no time for straightening

has been included in computing the costs of shaping Model A cam shafts.

"The time of 1.3755 minutes for shaping cams on Ford cam shapers has been determined from the computations by Mr. William F. Pioch, set forth in Defendant's Exhibit 264, which shows that one rotation of the Model T cam shaft in the Ford cam shaper took 25.3 seconds. Whereas, the Model A cam shaft would have taken 29 seconds. The proportionate increase from 25.3 to 29 applied to the 1.20 minutes for shaping Model T cam shafts for Exhibit 13. And, by the way, that is attached to Exhibit C—results in the amount of 1.3755 minutes for shaping Model A cam shafts."

In other words, I have used the cycle of the turning of the cam shaft, which is the perimeter method in setting down the production of Model T shafts from 1.20 minutes, which is 25 shafts per machine. I have stepped the time up, and the number of pieces down.

The time goes up to 1.3755, and the number of pieces down to, I think it is about 21, or 22, roughly.

Are there any questions on that?

I think that is a method similar to the one that Mr. Moise used in his area method or periphery method, except, that I believe, he made an adjustment for handling time, which I have not.

(1885) Do you care for me to explain that handling time in that respect?

Q. Yes. On that question of handling time, did you make any inquiries concerning how that might affect the operation, in view of the weight of the two shafts, the Model A shaft being a heavier shaft than the Model T? A. Well, I requested the time study department to give me an estimate on the relative times for handling heavier, for handling a heavier shaft, one against the other, giving them the amounts of something like 5½ pounds for the Model T shaft, and 11 pounds for the Model A shaft. One weighs about, about twice as much as the other.

And, Mr. Rauser, who previously testified here, told me that there must be some allowance for the larger shaft. In other words, fatigue enters into it, to a certain extent.

Q. Well, now, does your method of computation take that into consideration? A. My method of computation

assumes that the amount of handling time would vary in the same proportion that the machine time did.

In other words, the cycle of the machine on the T shaft slows down, or the time slows down on the A shaft from 25.3 seconds to 29 seconds. And, likewise, I have assumed that the handling time would slow down correspondingly in the same proportion.

Q. How would that affect the increase, or how would that affect the handling time? Did you make any computation as to the number of hundredths of a minute, roughly, that would increase the handling time? A. Well, assuming that the handling time would be approximately a **(1886)** quarter of a minute, or .21, or .22, as it was timed out here in this Westinghouse machine the other day; that would be approximately one-sixth—one-seventh of the total turning and handling time of the machine, the total operation of turning the cam, shaping the cam; and the one-seventh applied to this adjustment of, oh, three or four seconds. Let's see, it is from 25.3 to 29—less than four seconds. You can see that it is going to be less than a second difference, no matter which way you figure it. It is very simple.

Q. Yes. Your "four" there was not four seconds, but .04 of a minute, you meant? A. No. I was figuring the spread from 25.3 seconds to 29 seconds.

Q. Oh, I see. A. So that if you assume that if all the handling time was constant—in other words, if there was no variance at all—it would only mean a difference of one second in your computation. But, I know that, from what Mr. Rauser tells me, the handling time isn't constant, so that it is somewhere between no seconds and one second.

The Master: Well, why is your one second the upper limit? You are assuming that the handling time increases in proportion?

A. Well, that is as high as I have gone in my computation. That is the maximum amount I have used in this computation for handling. That is the maximum. I have used the cycle time, the maximum time as the maximum time, 25.3 to 29; that is a jump of three seconds and .7.

Now, if you figure the handling time is roughly about one-sixth or one-seventh of the total machine time, you see it **(1887)** takes about, over a minute, 1.20, to consume the whole operation.

Well, now, when you figure that the handling time is perhaps only .21 minutes or .22, or, say it is even .25 minutes, and that was what Mr. Rauser got approximately on the Westinghouse, and, I believe, also on the Walcott lathe the other day.

(1888) So, you can see that is a quarter of a minute against a minute and a quarter.

Well, that would be one-fifth. Well, one-fifth of your spread of your 3.7 per second is less than a second. And that is assuming that all of the handling time would be constant for that one second. It is less than a second.

Now, somewhere between that 0 and 1 second, there might be a point where you could just point and say that is the variance in handling time caused by handling time.

It can't be less than 0, and it can't be more than 1 second.

The Master: Well, it can't be more than one second if you assume that handling time doesn't increase in any higher proportion than machining time does when you use a shaft with a larger perimeter in the cams, and a heavier shaft; while the perimeter varied only very slightly between the model T and model A cams, the weight varied approximately one hundred per cent, did it not?

A. Well, in other words, you think that the handling time might be more than the difference between the machining time?

The Master: Well, I wasn't expressing any opinion as to what I thought. I was just trying to get clear as to how you arrived at the statement, or the basis of your statement, that the maximum increase in handling time would be less than one second. You are basing that on the assumption that handling time cannot or would not increase in any higher proportion than machining time?

A. That is right. That is right. Perhaps you are right there. **(1889)** However, if that would be true—you see, in Mr. Moise's computation, he has assumed that the handling time doesn't vary at all periods, and, I am assuming that it varies as much as the machining time. And, you have it in mind that it is even higher than that.

The Master: Well, I am just wondering.

A. Well, it is possible. I am not saying it isn't. I know there must be some difference, but I am not saying how much difference there would be there.

I don't think you could say there wouldn't be any. But, no matter what you used as the handling time if only a quarter of a minute or less, it is not going to be material in the net result. It is only going to be a matter of a second or two.

Q. (By Mr. Farley, continuing): I find the weight of the two shafts, the model A and the model T shafts are given on page 18 of the first statement of account. That is the finish weight? And the variation, finish weight, of the model T is 3¼ pounds, and the model A-6250 is given as 5½ pounds? A. I believe the rough forgings are from about 5.8 pounds to 11 pounds.

Q. Something like that. A. That is the rough forging. Of course, our operation is about a third of the way long. It wouldn't be either of those.

Q. That is right. A. You see, we are working on operations, about 12 or 13 pounds, so it might be about 4 pounds to 8, something like that. It is roughly 2 to 1.

(1890) Q. All right. A. Well, then, returning to page 9, we make a similar computation for the Ford cam shapers as we did for the Melling cam lathes. In other words, we multiply the production in column 1 by the hours in column 2, to get the average—I mean, to get the total number of hours for the two operations. Actually, there is only one, because there is no straightening operation.

All the way through, I assume that when I say two operations, I mean that there is no time for the straightening. Actually, there is only one operation.

Q. Well, why do you use the expression? A. Well, I just want to be comparable with the wording on the Melling cam lathes. In other words, I would like to infer there that the times should be corresponding for the same two operations; but, you have to go one step further and show that there is no straightening operation for the shaper.

In other words, if I said for one operation up there on the shaper, and, two operations on the lathes, why, immediately, somebody would raise the question, "Well, why don't you keep the one operation with the two?" At least, that is my idea. And, multiplying the number of hours times the other, you arrive at the direct labor operations in

column 4, which contains $86,921.15. And that total is carried to the summary on page 8 under the cost of Ford cam shapers.

Now, if you will add the three costs together, the direct labor, depreciation, maintenance repairs, you will get the amount, $143,884.75.

Now, that is the total cost for the two operations on the **(1891)** Ford cam shapers. You divide that by the total production of 4,220,990 shafts, and you get a cost per cam shaft of .0341.

And, likewise, if you do the same for the Melling cam lathes, you get the cost per cam shaft of .0413, and an overall loss on the four million odd cam shafts of $30,697.91.

Now, that takes us over to page 13.

Q. Before you go to page 13. A. Yes.

Q. Your depreciation figure is the same as that employed on the same sheet, sheet 8 of Exhibit C,— A. (Interrupting): Yes, I think—

Q. (Continuing): —is that true? A. Yes. I think I have already brought out that the direct labor operation is the only one I have changed.

Q. And the figures for depreciation you obtained from the machinery valuation records which were identified by Mr. Pellinger? A. Well, indirectly, yes. We obtained the cost of the machining from those records.

Q. Oh, yes. A. And, naturally, we had to figure the depreciation year by year.

As stated in Exhibit C, we used the depreciation rates which were allowed by the income tax department of the Government for the various years.

Q. Yes. And, as to the maintenance repairs, certain of those figures were taken from, also from the valuation costs? A. No. Those maintenance repairs were taken, were based upon the **(1892)** fact, or the testimony of the witnesses, now, that four men were used in department 410, for maintaining the Melling cam lathes on the second and third shifts, while only two men were used on the cam shapers on the same two shifts.

Q. And, you heard the testimony of Mr. Pellinger and Mr. Smith, that in addition to the four men that were used in the shop right down to the department 410, they had to keep two men working on slides and things in the tool room? A. I did.

Q. You made no additions to the maintenance repairs, however, in view of that testimony, did you; is that correct? A. No, I didn't change that figure at all.

* * * * *

(1895) Q. This figure that you have used, 60 per hour, is somewhat larger, is it not, for model A production on the Melling lathes than the figure given by Mr. Meyers when he testified? A. Yes. If you remember my first computation in Exhibit C was based upon 25 an hour, and that was based upon information obtained from Mr. Meyers, and, Mr. Shawkey, I believe, both of them, to the effect that 25 per hour was what they actually expected out of the machines.

However, in view of the fact that we found this operation sheet in the engineering files in the Ford Motor Company, I felt that we should use the time on the number of pieces that showed on an actual record.

And, I might state that throughout all my computations I have endeavored to use records that were available, and in that way, I have increased, or, in fact, I have decreased the loss on this computation from $15,000, I think, for just this one—about $12,000 for just this one change.

In other words, I formerly used 50 per hour for the Melling computation, and, now, I am using 60 per hour.

Q. What was the hourly production that you ascribe to the Walcott machines on the production of model T shafts in your original— A. (Interrupting): That is 35 per hour, based upon the Marantette **(1896)** time study, and also supported it by the Payne reports.

Q. Now, the Marantette time study being— A. Exhibit 14.

Q. (Continuing): —Exhibit 14? A. Yes; attached to Exhibit C.

Q. Attached to Exhibit C? A. Yes.

Q. And the Payne reports and the Marantette time study have been duly proven and identified by the witnesses, and received in evidence, were they not? A. Yes, they have.

* * * * *

(1899) Q. And, sheet 15, sheet 14, you have already discussed, have you not? A. Yes, I have. I have already covered that pretty completely.

Q. And the sheet 15 shows the manner in which you figured depreciation, is that right? A. That is right. You will notice that the total amount is $18,223.14, and that checks in with the schedule on page 13.

Q. Now, I notice that the next—is that all—any further comments—it doesn't seem to be necessary. A. Well, because of the fact that I didn't change the depreciation on the Melling cam lathe, why, that remains the same, and we need no substitute pages.

(1900) Q. Yes. A. I only inserted pages that were necessary, of course.

Q. Yes. And all of these pages are substituted in accordance with the correspondingly numbered pages in the other exhibit? A. That is right. In other words, the old sheets are no longer of any value as far as my computations are concerned. I don't mean to infer that both of these computations should be left in the record, at least, the result.

Mr. Spohn: What was the last there? Will you read it back, Mr. Reporter?

(The answer was then read by the reporter.)

The Witness: Did you get what I mean? I mean one is—

Mr. Spohn (Interposing): One is a substitute for the other?

The Witness: One is a substitute for the other, yes, in so many words.

Q. (By Mr. Farley): Now, as far as your page 17 is concerned, are you ready to take that up now? A. I believe so.

Mr. Farley: Just off the record a minute.

(Discussion off the record.)

Q. (By Mr. Farley): All right, go ahead. A. Do you want me to go ahead on 17?

Q. Yes, please. A. I have already testified in the prior proceedings, this schedule 4 is a method, so-called comparison method.

In other words, if you find a loss on the model T shaft, using as a standard of comparison, the shaper, and assume that **(1901)** you could have used the shaper on the F shaft, that same rate of loss would apply per shaft.

Taking the first example there—we had a loss on the model T shaft or comparison, using the shaper, of $35,585.35. Well, now, we produced cam shafts to the number of 3,420,166.

Now, that production divided into the loss will give you a loss of .0104 per cam shaft.

Now, we produced 275,664 model F cam shafts. And, if we apply the same loss per shaft that we determined in the T comparison there, multiplying that loss times the F production, we get a loss of $2,866.91.

Now, if we use the Model A comparison, using as a standard of comparison, the shaper, again we get a production of 4,222,999 shafts, and, we lost on that production $30,697.91. Applying that same loss per shaft of .0073 to the production of the model F shaft, we get a loss of $2,012.35.

* * * * *

Q. (By Mr. Farley, continuing): Well, now, on these comparative costs as set up in these various schedules, I note that there **(1902)** was no charge for burden, as such, is there? A. Well, now, by burden, or overhead, you mean the extra cost in addition to labor.

Well, now, burden includes depreciation and maintenance repairs, and I do have those. Those can be classed as burden or overhead. And, in the model T comparison, I also have extraordinary repairs, which is another form of burden.

You will note on the bottom of page 8, or in fact, on the bottom of every summary page of each schedule, this note, and, I will read as follows:

> "No cost records are available to show by separate operations the comparative power cost, tool costs, scrap losses or other incidental items."

Now, I would like to explain our theory—by that I mean, Mr. Russell's and mine on this method. Just think of what problem you are up against when you are faced with the problem of determining how much one machine costs to operate as compared with another. What do you first think of?

Of course, you think of the operators first. How much time it takes him to perform his jobs on that machine. Then

you think of the cost of the machine itself. And that is how you figure your depreciation.

Now, naturally, no two machines would cost the same amount of money. There must be some difference—unless there is one chance in a thousand or a million—so, there must be some difference in the depreciation cost. Then, there is maintenance cost.

(1903) No two machines will operate identically as to maintenance. Now, so far I have been able to determine the direct labor cost, the depreciation cost and the maintenance cost.

Now, to my mind, the only other major cost might be tool costs. And, I believe, it was brought on in testimony here that tool costs for Melling machines would probably run higher than tool costs for the Ford cam shapers.

Therefore, if I have omitted the tool costs from my computations, I have necessarily penalized the defendant, because, had I been able to determine the tool costs, it appears that my loss would—computations would be greater instead of smaller.

Now, to me, those four items—labor, depreciation, maintenance and tool costs—would be the major things I would look for in the difference between the operations of one machine as against the operations of another.

Well, having those four main costs, I believe we have got the meat of the whole proposition.

However, let us go on down the line and take the other costs which will probably be included under the term of burden or overhead. We mean taxes, insurance—well, now, taxes would be property taxes, perhaps, mainly, and maybe, you get an element of income tax, but, anyway, the tax item shouldn't vary very much between machines. It should be fairly constant.

And, insurance—that should be immaterial. Heat and light should be on perhaps the space occupied. And, I **(1904)** believe that the 16 Melling lathes would probably occupy more space than the 13 shapers.

I don't know for sure. But, anyway the difference wouldn't be material.

Then, you take power costs. Of course, these machines are all run by motors, and it is possible that the power costs might vary slightly. It depends on, I think,

the horsepower of the motor. We were unable to determine exactly which type motor was used on each machine.

Q. Let's see, does the permanent inventory shapers—do any of those cards specify the size of the motors to be used? A. I think we bought those without motors. At least, that is my recollection of it.

(Mr. Farley refers to some papers.)

Mr. Farley: It apparently doesn't specify on these cards—but—just a minute—

A. I might go on to say that another item might be —of course, supervision—and supervision would include shop supervision. In other words, the superintendent, the foreman, and, from the testimony that has been given heretofore, I think that the Melling lathes appeared to have caused more trouble and needed more supervision than the shapers. However, we have nothing definite on that, so I haven't attempted to make any computation on that basis.

Q. You mean supervision on the part of the foreman? A. Yes.

Q. Now, on this manner of spacing, this matter of space occupied by the machines, I notice you just said that you thought that **(1905)** the model T cam shapers probably occupy more space than the Walcott machines? A. I said less.

Q. Less space? A. I said probably that the Walcotts would probably occupy more space than the shapers.

Q. I twisted it around inadvertently. And, I find that by taking the Defendant's Exhibit 53, the photograph of the cam shaper, and measuring one of the cam shafts that appears on that photograph of the model T cam shaft, you see it is just 2⅛ inches long. The bed of the machine measured in the same way is 4¼ inches long—a little less than 4¼ inches.

Q. And the photograph is a straight view in front, so there is no distortion, appreciable distortion, because of perspective.

I just mentioned one of these model T cam shafts. I find it is 23 inches long, and, therefore, that would give you a space of about 46 inches square for the bed of the machine.

Do you remember seeing the Walcott machine out there at the plant? Would you say that the Walcott machine

was very much longer? A. Oh, I believe the Walcott was considerably longer. There must have been a half dozen men lined up on one side of that Walcott machine. It looked pretty large to me.

Q. All right, go ahead. A. Regardless of that, the comparative heat and light probably (1906) would be minor in any computation, so that I haven't considered that either.

Q. Heat and light? A. Heat and light, yes. In other words, I have taken the major items that would really mean something in a difference computation.

Q. Well, now, suppose you had used the alternative method of applying the departmental burden rate, which, I understand, is available for many of the months of the period in question, what effect, if any, would that have upon your computations? A. It would still result in a loss. But, let me explain that. That is only an approximation method.

In other words, you are only dealing with one factor in that. You base everything on direct labor.

In other words, as direct labor goes, so goes the burden or overhead, because you apply a percentage of direct labor to arrive at your burden figure. So, actually, it would do you just as well for comparative purposes to just compare direct labor.

That is the only element that you have got in the direct labor computation, and takes on an added percentage for burden.

Now, that doesn't get you any farther than where you were to start with on your direct labor. Therefore, that is only one element out of at least four major elements that you must consider in arriving at comparative costs of operating two different machines.

(1907) In other words, if you get a loss by using just direct labor, you will continue to get a loss if you add on a certain percentage of that for burden.

The Master: Well, it wouldn't mean anything if you assume a loss. Where there was a profit, it would become very important.

A. If there was a profit, you would add just so much on profit.

In other words, if direct labor results in a profit by your burden method, you just add on 150 per cent, say, for burden. But, you wouldn't take into consideration, perhaps, the varying costs of other operations, other elements of costs, such as maintenance or depreciation.

Those wouldn't even be considered in that very instance, because you have assumed that direct labor is the only varying quantity or element.

Suppose you do have a profit on direct labor and a loss on maintenance, say.

The Master: Yes.

A. Well, now, if you add a certain percentage of the direct labor on to the direct labor profit for burden, you can use that as your final figure. You forget the fact that your figure showed a loss, and that is a burden element.

The Master: Well, I suppose that is beyond question from a theoretical standpoint, that method wouldn't be satisfactory into going into the various items of overhead in determining how much profit or how much cost is attributable to each one of them.

There might be a question as to whether or not it is a **(1908)** practical matter, particularly in view of the fact that the Ford Motor Company has kept its cost figures on a basis of direct labor plus a certain definite percentage for overhead, based on the direct labor costs, as to whether you can get at the actual overhead which should be attributed to the respective machines any more accurately by your method than by the other method?

A. Well, I will grant you that for general accounting purposes, the burden percentage direct labor is used, almost universally for general accounting purposes, because that is the easiest method that is available, because that gets in your whole cost. Your whole burden cost is into your figure.

In other words, you take your percentage, your whole burden cost is to the labor, and you get that in your accounts, naturally. But, here we are faced with determining the cost of the operations of two machines.

Q. (By Mr. Farley): The operation of one machine as compared with the operation of other machines? A. Yes.

Q. Assume now, for the sake of the assumption, Mr. Woehrle, when the Ford Company is determining cost of the part cam shaft, the entire cam shaft, as shown in the cost summary cards, it is essential there that the item of burden be added to determine how much money it is costing the company to make that particular part? A. That is right.

Q. That is right? A. Sure.

(1909) Q. Now, assume that, let us say, that some one of these months, where the burden was 180 per cent, we will say— A. (Interrupting): Yes.

Q. (Continuing): —I think there were some months where burden figures were exactly that high. And, that, of course, includes all of the advertising, and all of the cost of the administration, and everything else that goes into the swelling of the expenses, but which have nothing to do with direct labor—that is true, too, isn't it? A. Well, you might be going a little bit too far when you include advertising in that.

I don't know actually what they include in their overhead percentage, but, usually it is the supervision and salaries of the shop men. The others are the administrative expense. That is not included ordinarily as a burden cost, but as a separate cost.

The Master: Don't you understand that in the Ford system it is included in the burden cost?

A. Well, I think Mr. Hovis testified that certain administrative expenses were, but, I doubt very much, unless the system is unusual.

The Master: Well, they have got to be figured somewhere in the cost.

Mr. Farley: It would seem that way to me, too.

The Master: After all, they have got to get enough money in selling automobiles to take care of those expenses.

A. Well, I think ordinarily you will find there is a cost of manufacture, and, then, there is so much allowed for selling (1910) and administrative expenses over and above that.

Now, your overhead is only in the cost of manufacture. Actually, that is the figure they apply to direct labor when they figure their manufacturing costs.

Q. (By Mr. Farley, continuing): Well, now, of course, if we take all of the figures which enter into the Ford system of figuring burden—let us assume, of course, that that would include, just we will say, four or five sweepers in the entire department, in the cleaning of the department, and probably ten supervisors as foremen, and all of the other odds and ends that they would have around as maintenance in the department—would you, as an accountant, reach the conclusion that the change in the type of one machine to another machine in the department would affect that burden in any way? You see what I mean? A. No, I don't think it would. Except as I said in supervision of the two machines by the foremen or more that had to work—I mean supervise—that might change—it is possible that might change it very slightly. I might increase my span of saying shop men, to include an overhead of anybody in connection with the production, or, like anybody, even the vice-president, Mr. Martin, his salary might be included; likewise, Mr. Sorensen.

Q. Herklotz and men of that type? A. Yes; who are actually supervising production. It is possible even to get some of the higher-salaried men in the burden figures.

Q. Well, now, just assuming the situation here, and assuming that (1911) you were going to attempt to determine actual profit that might be made by the Ford Company merely by the use of one machine as compared with another machine, and assuming that your figures, instead of showing a loss, had actually shown a profit; do you think it would be proper to add to that profit, to load that profit, as it were, with the burden figure, that could be said in any way to be profits made by the company by the mere use of the machine? Do you understand what I mean? A. Yes, I understand what you mean.

Well, the way I think that any of these elements of burden, they would be different for one type of machine as compared with the other, and should be taken into consideration. Now, whether Mr. Martin's salary, or Mr. Sorensen's salary, or some of the higher salaries that are included in this percentage should be tacked on, now, that is another question, which, I don't think should be added.

In other words, I don't think the total burden percentage, perhaps, should be tacked on to the labor cost, be-

cause there must be, perhaps, be some elements of burden that don't affect the two machines in question.

Q. That is in no way affected by the operation of either machine? A. That is true. There might be some of that.

Q. In fact, assuming all of these elements that go into the figure which comprises the burden of 180 per cent, most of them would in no way at all be affected, or made to vary by the change of one machine or another machine, is that true? A. Well, you are going pretty strongly in saying most—but there **(1912)** is no doubt that there are some expenses in that burden figure that don't affect either machine.

Q. That would not affect either machine? A. No doubt about it.

The Master: Well, there would be some expenses in addition to the four or five which you specifically considered here?

A. Yes.

The Master: Which would be affected by a higher direct labor cost in the use of one machine, attributable to another, for example, your payroll department would have more to do, and your personnel, and, then, there would be things of that sort that would have to be taken into consideration, would there not?

A. Well, I think that would vary on the number of men rather than the actual dollar expense. .

The Master: Well, you are figuring the labor rate as being the same with each machine, and, so, probably, if there was a variance in labor costs, why, that variance would be attributable to the necessity of using more men on the one machine than on the other?

A. Well, now, wait—we are figuring the time it takes a man to operate one machine; not the number, but the time.

The Master: Well, if it takes one man, for example, if it takes just twice as long to operate one machine as another machine, why, you perform the same operation, the men aren't working any longer, but you will have to have just twice as many men for one as the other, wouldn't you?

(1913) A. Oh, if the difference is that great, yes. In this case, we have 16 machines against 13 or 14, say. Now, that may mean a difference of one man.

The Master: Well, there may be a slight difference, or there may be a great one, but the principle is just the same, isn't it?

A. Well, I suppose you are right. But it seems to me that the added clerical help to maintain or supervise the duties of this one added man, it is so small or minute, that it is hardly one to consider.

The Master: Well, I thought Mr. Farley was getting away a bit from this particular statement of account in asking the more or less general question as to whether if a profit were revealed by a comparison of two machines from a direct labor standpoint solely, as to just what or how you would compute the burden, how you would take into consideration that in determining what the total profit was. If you take these, your comparison on the two machines that you have made, the cam shaper and the Melling cam lathe, and accept your figures, why, you get a deficit anyway on the direct labor, or, so I think.

A. That is right.

The Master: Mr. Farley's question went beyond—

A. (Interrupting): That is right.

The Master (Continuing): —the account of the general question, and that is what I assumed, and that is the reason I asked my question that way.

Mr. Farley: Well, perhaps I was getting a little bit **(1914)** off the subject there myself. I was just a little bit curious about it. But my general impression was that will exist if there was a situation of this kind, it wouldn't seem to me, it wouldn't seem to me that, where the savings that we talk of in a situation of this type, assuming that there was a saving, would be the reduction of the hours of productive labor, than that the other variable of standing overhead should in any way be any part or measure of that. That is what was running through my mind.

The Master: You mean you would have to have that overhead anyway, even with a few employees?

Mr. Farley: Yes, I mean you would have to have that overhead anyway even with a few employees, and it wouldn't make any particular difference to the overhead figure.

Assuming that you had an overhead granted for the number of law books you had in here, and it wouldn't seem that it would make any particular difference to the post-office department whether you have U. S. Reports in there, or Michigan Reports on the shelves. That is the way the thing was sort of running through my mind, and I wanted to see from Mr. Woehrle, as an accountant, whether I was right or wrong. That, by taking that box there and putting a desk in place of it, it wouldn't seem to me that it would be an overhead chargeable to the building, except the depreciation figure which he has separated.

The Witness: Well, naturally, there are certain items which should be considered, and certain items which should be excluded, and I considered all the important ones, I believe; **(1915)** and the others are immaterial.

In other words, the others shouldn't vary one machine as against the other. They shouldn't vary considerably.

I am assuming that they are practically equivalent.

The Master: Off the record, Mr. Reporter.

(Discussion off the record.)

Mr. Farley: Suppose we mark this one Exhibit 299.

(The document above referred to was thereupon marked Exhibit 299.)

Mr. Farley: I don't suppose there is any objection to this in evidence, is there, Mr. Spohn?

Mr. Spohn: We have no objection to the offering of it, but, we don't want to be bound by the figures.

Mr. Farley: That is all right.

Mr. Spohn: In other words, we had no opportunity to check these figures. In other words, if it becomes necessary to offer our own proofs on it, that we may be permitted to do so.

The Master: All right. Then, we will adjourn until 10 o'clock tomorrow morning.

(Whereupon an adjournment was taken until Friday, February 3, 1939, at 10 o'clock A. M.)

* * * * *

(1918) RE-DIRECT EXAMINATION (Continued) by Mr. Farley.

Q. Now, at the conclusion of the hearing last night, as I recall it, we were discussing the matter of burden, and I believe you stated you would make some effort to find out just what was included in the burden figures which are employed on the cost summary cards, and other similar records of the Ford Company, and which gave certain burden figures ranging, if my memory serves me right, from probably 150 to 200, per cent, and over 200, in some cases.

Did you make any effort to get any more detailed information on that? A. Yes, sir, I did.

Q. And, just state the source of your information, and what the information is. A. I called Mr. Fred Hovis this morning—as you recall, Mr. **(1919)** Hovis testified here, and is an employee of the Ford Motor Company—asking him to give me a breakdown or a detail of the accounts which made up the overhead computation or percentage; in other words, expenses that were included in the computation, to arrive at the overhead percentage of, say, 150 per cent or 160, whatever it might be. And—

Q. Just for the purpose of the record, so that the testimony would tie up with some of the definite records, let us assume, take, for example, one of these cost summary cards—this will do as well as any—I am referring to Exhibit F-3. Let us take the last month there, I think it is November, 1924—well, that isn't a good one, because that isn't in the so-called accounting period. Perhaps you could select one of those yourself. A. All right.

Q. You are more familiar with them. A. Suppose we take F-6. And, the month of March, 1928, for instance. Now, for Department 410, it gives labor cost of .4926 and a burden cost of .5742. Now, if you will divide the burden by the labor, you get the percentage of burden that has been applied to that labor figure.

Q. What is that, a "T" card? A. That is a "T" card; yes.

Q. That was March, 1926, did you say? A. March, 1928.

Q. March, 1928. Now, I see in one of your computations, I am referring now to Defendant's Exhibit 200, that figured according to your computation there 117 per cent. A. I believe that is about right.

(1920) Q. I will show you your own (handing document to witness). A. All right; 117 is right. That was obtained from cost summary card form 3566, and that is the Exhibit F-6.

Q. Will you continue and explain, Mr. Woehrle, just what is included in that burden figure? What are the accounting practices of the Ford Company? A. It is a practice of the Ford Motor Company to include therein administrative salaries or portions thereof—and, by "portions thereof," I mean, perhaps, I might mention a few names; Mr. Martindale in the cost department, his salary is split 50-50; Mr. Bennett in the service department is split 50-50.

Q. Just what do you mean split 50-50? A. 50 per cent to manufacturing expense and 50 per cent to commercial expense.

Q. And, therefore, the overhead burden in Department 410 would be in the manufacturing expenses, and 50 per cent of that salary would be charged against that department proportionately? A. For manufacturing expense.

Q. Yes. A. In other words, these men devote a certain part of their time to the actual production of the car; and, in accounting practice any expense in connection with an actual manufacture of the car is a justifiable charge to the manufacturing expense which, in other words, is your overhead or burden.

Mr. Spohn: Who was the second man, Mr. Woehrle?

A. Mr. Bennett.

Mr. Spohn: Mr. Bennett?

A. I don't know whether I want to mention all of these men. **(1921)** But—

Mr. Farley: I see no objection.

A. Mr. Edsel Ford is 50-50; Mr. Sorenson, 100 per cent of his salary is in manufacturing; Mr. P. E. Martin, 100 per cent of his salary is in manufacturing; those two men have offices right out in the plant, and spend practically all of their time, as I understand it, in the direction of the production of the cars.

Mr. Farley: That is correct.

A. That is the first account that is put into our overhead computation.

Q. Of course, you haven't got the figures of salary there? A. No. They didn't call those over the 'phone. In fact, those are on the parts list, the salary list, and they are confidential. If it goes far enough that we have to get to a percentage of what the direct expenses chargeable to burden are, or the indirect, we might have to go that far. I don't know. But, so far we haven't done that. I have a list here of some 30 accounts which go into the burden percentage, and I assume you want me to read them all into the record.

Mr. Farley: Yes. I think it will be best.

Q. Well, let us start at the beginning, and make a list of them.

A. Account 600, administrative salary;
601, depreciation, land improvements;
610, depreciation,—

Mr. Spohn: A little slower.

Mr. Farley: Mr. Spohn, we will give you a photostatic copy, or have this typed up.

Mr. Spohn: All right. That will be fine.

(1922) A. (Continuing):
610, depreciation of buildings;
620, depreciation, machinery;
625, depreciation, durable tools;
630, depreciation, factory and miscellaneous equipment;
645, depreciation, freight car equipment;
650, depreciation, locomotive equipment;
660, depreciation, power equipment;
681, insurance;
682, experimental engineering and designing;

683, moving and re-arranging department;
684, factory supervision;
685, final inspection;
686, miscellaneous manufacturing expense;
687, power operations.
And, by that I mean to include heat, light and power,—

Mr. Spohn: All three?

A. (Continuing): Heat, light and power in that figure because of the fact they produce their own power out there. They have their own power plant, and the steam is generated in the plant for heating, and all of the electricity is generated in the plant.

Continuing with the expenses, we have
Account No. 690, repairs to land improvements;
700, repairs to buildings, fixtures, and structures;
710, repairs to machinery;
715, repairs to durable tools;
720, repairs to factory and miscellaneous equipment;
735, repairs to freight car equipment;
(1923) 740, repairs to locomotive equipment;
750, repairs to power equipment;
755, expense, tools;
757, insurance, which is employees' liability and compensation.

Mr. Spohn: 757?
Mr. Farley: Yes.

A. (Continuing):
766, sweeping and cleaning;
780, taxes, state, city and county;
781, taxes, social security;
I might state that that is a recent expense, and no doubt during our accounting period that expense was not in existence.
(Continuing):
785, miscellaneous services for employees;
That includes first aid and things like that.
786, timekeeping, payrolls, and factory clerical salaries.

Q. (By Mr. Farley): Now, that includes 31 different items, which are incorporated into the burden figure as given in the cost summary cards? A. That is right.

Q. Now, how many of those factors, in your opinion as an accountant, Mr. Woehrle, should properly be taken into consideration on a matter such as we have before us where your effort is to determine comparative costs in the use of two machines for performing one of the 50 or 60 operations in that particular department? A. Well, going down the same list, the first item that I come to which I would include would be Account 620, depreciation of **(1924)** machinery. As you recall, that is included in my computation, Exhibit C and Exhibit C'. The next item is 625, durable tools.

Q. Now, durable tools there, do you understand what that is intended to refer to? A. Well, that is usually in like presses and punches, and, oh, things that are pretty heavy that might last a number of years such as, oh, jacks and these automatic lifting devices for swinging equipment around. I forget what you call them. It is possible—

Q. That apparently, then, is a separation in two separate items of two different types of machinery, is that the idea? A. That is right. Now, I might state that as durable tools themselves, it is possible that none of those durable tools were used around the machines in question which we are here accounting for.

Q. So, it would be your opinion that it would only be the item 620, depreciation of machinery, which could or should be considered, and as I understand your computations, and your testimony, you have included that in your computations? A. That is right.

Q. Very well, now. Are there any other items on the list which, in your opinion, should be taken into account? A. Well, 681, insurance, might be taken into account; fire insurance, or insurance on the machinery itself might be an item. But, it would be very immaterial.

Q. How would the item of insurance affect the matter of operating these machines? A. Well, it wouldn't affect the operating at all.

(1925) Q. Of course, it is the cost of operating that is the matter we are concerned with here, isn't that right? A. Well, it is also the cost of maintaining the machinery. In other words, I mean like depreciation cost, you figure on the cost of it, and if you have, if you insure one machine for more money than you insure another, why, that might

affect it, or that would affect it. If you assume the insurance is based upon, say, the total building, one machine against the other probably would be immaterial.

Q. I can see there might be a factor there if one machine, for example, we will say, cost $50,000 and one $5,000. A. That is right.

Q. Do you know anything about what those insurance rates are? A. Oh, I wouldn't want to make a guess, no. I don't know exactly. I have seen quite a few of them. I think it is something like 21 cents a thousand, or gets up as high as 38 cents a thousand, depending upon the location.

Q. That is for a year? A. That is over a three-year period, I believe.

Q. If it is 21 a thousand, that would be 7 cents a year a thousand, and if the variation between the two machines is only a matter of a couple of thousand dollars, it wouldn't make very much difference in the computations? A. No, I don't think in figuring your insurance schedule, if you took out one machine and put in another, I don't think the person figuring the amount of insurance coverage you should have would be affected by the mere change from, say, a $5,000 machine to a $4,000, or vice versa. In fact, as a matter of fact, the shapers cost more money than the Walcott machines, **(1926)** and if we were going to consider that factor, we would take out a little more insurance, perhaps, if we were being—

Q. It would tend to increase the cost of operating the shaper. A. Well, as I said, just from a $5,000 to a $4,000 machine; a thousand dollars wouldn't be material.

The Master: You are talking about direct insurance on the machines themselves. As far as the insurance on the plant, and indirect insurance of that sort is concerned, do you understand that is grouped under that insurance item there?

A. That is all insurance, yes. I don't think they would insure the machines separately; they insure them as a whole.

The Master: Insofar as you were considering, take, for example, fire insurance on the building itself.

A. That would be fire insurance on the building and contents,—

The Master: Wait a minute.

A. (Continuing): —which includes machinery and equipment.

The Master: Well, if you had a more expensive machine which you installed, which, however, took up considerably less area of space than the other machine, insofar as the part of the insurance premium which is attributable to the machine itself is concerned, you would have higher insurance cost, but insofar as the part of the insurance premium which is attributable to the building itself, your cost, which should be allocated to that machine, would be reduced, would it not?

A. Yes. But, I don't think anybody figures that close. That is getting pretty close when you figure that. As a matter of fact, insurance wouldn't affect the two machines, I don't **(1927)** believe. I don't think anybody would try to make a computation on that.

Q. (By Mr. Farley): Now, the items on the list that, in your opinion, should be taken into consideration, insurance was the last one? A. Well, of course, power operations, as was mentioned yesterday, which included heat, light and power, would be affected if the machines, for instance, the space occupied—heat, and light are figured on the space occupied. And, as we said yesterday, if the space of the Mellings was greater than the space occupied by the shapers, why, the cost of heat and light on the Melling machines would be greater than the heat and light on the shapers.

Power would depend upon the horsepower of the motor, horsepower rating.

The next item is repairs to machinery; and, as you recall, I have included that item in my computation, Exhibit C, and Exhibit C'.

Q. Under the heading "maintenance"? A. Maintenance; that is right.

Q. Maintenance repairs, I should say. A. Maintenance repairs.

Q. All right. A. "Expense, tools," would probably have in it the cost of the tool bits for the machinery. And, as I said yesterday, we don't have any actual cost figures on those, but testimony of certain witnesses tends to prove

that the tool cost on the Mellings would exceed the tool cost on the shapers.

Q. And that means, then, of these 31 items, in your opinion, the **(1928)** only ones that should be taken into consideration in these computations would be the 620, depreciation of machinery; the 710, repairs to machinery; and, 755, the expense of tools, with the possible exception of power operations, or insurance. A. And, I might also say taxes would be in the same category as insurance.

Mr. Spohn: Taxes, also, Mr. Woehrle?

A. I think if you have—taxes should be computed on a valuation basis. Of course, that would be on the cost of the machines.

Mr. Spohn: What account number is that, Mr. Woerhle?

A. That is 780.

Mr. Spohn: Yes, I have it; all right.

A. And, naturally, if the cost of your machines varies materially, you might prorate a slightly different amount for taxes to those various machines.

Q. (By Mr. Farley): Now, on the power equipment, if the two machines, the shaper and the Walcott machines, used exactly or very nearly the same horsepower motor, would you consider that, if that were taken into consideration and you found the cost of power or electricity to the Ford Company, would you think that that would make any appreciable difference in the computations you have made? A. No. Assuming the motors were the same, there would be no difference in the computation.

Q. I wonder if you noticed that the Walcott machine had, at Highland Park, a five horsepower motor for driving it, and on the Westinghouse machine they had only a three horsepower motor? **(1929)** A. I didn't notice. I know that the Walcott machines were ordered with a five horsepower motor. I don't know what they used on them.

Q. I don't suppose you make any check to determine what the power, electricity, cost the Ford Company per kilowatt? A. No, I didn't.

Q. I think we are justified in assuming that, naturally, the company operated their own power plant, which is

known to be one of the finest in the country, that the cost of power per kilowatt, then, is much less than if they purchased it from the electric company. That being true, would you think that you should take into consideration, let us say, in comparing the Westinghouse machine with the Walcott machine, the variation of the results from using a three horsepower motor instead of a five horsepower? A. Well, regardless of the total expense—in other words, if it would have cost Ford, say, 10 cents per kilowatt hour, and it only actually cost him 5, naturally that will cut down the proportionate difference. However, if I had a three horsepower motor as against a five horsepower motor, I would take into consideration the difference in the power consumption.

Q. I don't know whether you are sufficiently familiar with the electrical matters to have any particular judgment to present, or opinion to present on just what difference that would make in dollars and cents over this entire period of operation. A. Well, naturally, I am not familiar with the actual power cost, but if you take it this way and figure that two machines in that mammoth plant out there, you would have to pro rate, **(1930)** say, the total power cost per year over, say, 10,000 machines, and we are only interested in one machine. It is very likely that the power cost which you would ascribe to one machine would be very, very small.

Q. Very insignificant? A. Possibly, yes.

The Master: Do you know whether the power consumption varies directly with the horsepower rating of the motor?

A. No, I don't know of my own knowledge. I have been told that is one of the factors; at least, the most important factor, I believe. I think you have to also consider the voltage, or something else that you get.

Mr. Farley: That is right.

A. I wouldn't say of my own knowledge that that is true.

Might I add a few comments at this point?

Mr. Farley: Surely.

A. Just to sum the whole situation up; in other words, I assume that this total cost of department 410 for burden in

one month totals up to $100,000, and that is, say, 150 per cent of the direct labor. And, you have a situation where you added on 150 per cent of direct labor, which includes all of these various expenses.

Now, to me to add on to the direct labor cost of one machine as against the other, all of those overhead expenses is not right, because, see what you do; it is true you use the same burden percentage for both machines in the same month, but you are accumulating, adding on top of each side, each of your comparisons, say, 25 or 30 expenses, or 25 expenses, roughly, that, perhaps, do not affect the machines **(1931)** directly. There are no direct charges to the machines.

Q. (By Mr. Farley): You say "perhaps"? A. They did. So, what you are doing is pyramiding the burden cost and adding it on to labor.

Q. You are pyramiding the first figure you get by your direct comparison of productive labor by figures which really have no direct bearing on the comparison you are attempting to make, or the comparison of the figures you compiled, to show the actual facts as accurately as possible. A. That is right. Now, if we were to figure a burden percentage to apply directly to these machines, I believe it would be fair, or actually accurate, more accurate, to pick out the expenses which I have designated here as direct expenses, and figure the percentage on that, instead of taking all of the expenses in the computation of the total burden for the department. You might get an amount such as, oh, 50 per cent for burden instead of 150.

Q. Irrespective of any question of fairness, Mr. Woehrle, I think, if you will recall my definite instructions to you, when you started this particular work, was to get the facts and the figures from written records as far as they could possibly be ascertained, and from a study of the facts where some record might not be available to establish a fact, and to make the computations as accurately as possible. Eliminating any questions of fairness or unfairness, now, would you say that your computations have been made on that basis, from the standpoint of accuracy or presenting the true pictures? A. Oh, absolutely; no doubt about that.

(1932) Q. And, from the standpoint of accuracy, you would not, then,—it would not, in your opinion, be accurate

to include any of these 31 burden items, items that are constituents of the final or full burden figure, which is used by the company in the cost summary cards? A. I would use only a portion of them.

Q. And those which you have already testified? A. Which I have already testified.

Q. And, you do not think it would be accurate to include the others which you have eliminated? A. No, I do not.

Q. Now, as Exhibit C' consists merely of certain substitute sheets for the statement of account that you prepared, and which is entitled "Defendant's further statement of account," and which was marked originally Exhibit C, I think I would like to run over with you, briefly, the pages of your original Exhibit C, and your computations as contained therein, and have you state whether or not the facts which have been established by the testimony here, which you have listened to; what influence, if any, those facts would have upon your original statement. Suppose we take up, first, your paragraph 1 of Exhibit C, which was denied by the plaintiffs. The purport of that paragraph is that you had figured your computation as taking in the entire period because you state: "It would be less complicated than if an attempt were made to segregate or separate the entire period of operation by monthly, quarterly or annual periods of time." What can you state about that, as to whether or not you would change that now in view of the plaintiff's denial of it, or in view of any of the testimony which has just been offered? **(1933)** A. No, I think that stands as is; there is no change that I would make in that paragraph.

Q. As a matter of fact, your computation there was based upon, as I understand it, and your reference there, to taking the lump sum or annual sum, it might be termed, as contained on your sheet 1 of schedule 1. That is what that particular paragraph had reference to, is it not? The reason I am asking that is because I notice that your sheet 2 does give all of the figures on a monthly basis. A. Yes. For direct labor we do have it on a monthly basis, as set forth in schedule 1, sheet 2, month by month. Now, if you wish to arrive at the annual amounts, you will notice they are spaced off there with spaces between years. It would

be a simple matter to check those, and get your annual amounts, year by year.

Q. So that it is just merely a matter of arithmetic involved there, you might say, as to whether you are going to get the total figures as you have them on your sheet 1, a sum total, or to set them down on that sheet on a yearly basis and add them up on sheet 1. Isn't that about what the situation is? A. Well, for direct labor that would be a simple matter, as you say, to add them up by years, and then place them on the summary by years also instead of by total period.

Q. Now, suppose you had prepared your sheet 1 on an annual basis, or a monthly basis; would it change the situation at all? A. For direct labor it wouldn't change it a bit; not a cent.

Q. You say for direct labor it wouldn't change it a cent. Would it change it for any other figure that you took into account in making your computations? **(1934)** A. Well, of course, depreciation, now, we have gone on the annual basis, and that is a customary method for computing depreciation; and, naturally, if you want to figure that by years you would take the number of months in each year—for instance, in 1925, you have got 6½ months. Well, now, having the total depreciation cost for one year, you would take 6½ over 12, 6½/12, of that for the partial year, 1925.

For 1926 you need the whole year, so you take the whole year depreciation. So, when you got through dividing those by annual periods, you would still return and arrive at the same depreciation figures that I have for the total period involved.

Q. Now, just for the sake of the record here, or a little clarity. Suppose you just make a survey, without repeating all the figures in the record, of the sheet 2 of your schedule 1. As I understand, your computation, if you compare the figures in—I think you would call it the fifth column, which is entitled, "Direct labor cost of three operations," with the figures in the last column at the right-hand side of the sheet, "Direct labor cost of three operations," running down those two columns rapidly, do you find any month in which the direct labor cost, as computed by you for the use of the Ford cam shapers, exceeds the direct labor cost in any month for the use of the Melling cam lathes? A. Month by month there would be no direct labor cost on

the shapers which would exceed the direct labor cost on the Mellings, nor if you figure it year by year would it make any difference. You would still have a loss, or an excess cost **(1935)** on the shaper operations over the cost of the Melling cam lathe operations, no matter which way you figured it; month by month, year by year, or period by period.

Q. And, how would those figures be modified on the matter of depreciation which you were just discussing? A. It wouldn't be modified at all. In other words, you would have the same relationship month by month, or year by year, as you do have in the period by period comparison.

Q. Well, now, going again to the sheet 2, in your column 3 there under Ford cam shapers, "Hours required for three operations," production multiplied by 3.50 minutes, or by .05833333 hours, I notice you use the same language in column 6, but you have different figures. Now, just what is the significance of this three operations you are talking about there? A. Well, I would like to direct you to page 19 of Exhibit C, the bottom of the page. You have there a summary of the minutes required to put a cam shaft through three operations; they are straightening, shaper, turn cams,—one man operated two machines—and, third, finish grind cams. The Ford shaper, using no straightening operation, and adding the so-called three operations together, you get 3½ minutes for the shaper, and, likewise, on the Melling cam lathe you get a total of 3.66 minutes, using a straightening operation of a half minute.

Q. Now, as the time, minute time there, 1.20, is, I might state, a rather crucial figure, I would like you to again repeat as to where you got that particular figure? A. That is taken from Exhibit 13 attached to Exhibit C, operation No. 12; 1.20 minutes, and as you recall this exhibit is a **(1936)** typed copy of Spencer Libby's notebook, in which are a list of the operations of department 410.

Q. And, do you consider that Exhibit 13 and the Spencer Libby notebook, in view of the testimony you have heard, and in view of the independent investigations you made, a sufficiently definite or accurate record of the Ford Company that will enable you, as an accountant, to rely upon it? A. I do.

Mr. Spohn: It is a pretty broad question, your Honor.

The Master: It is rather broad, but I will let it stand.

Q. (By Mr. Farley): Now, referring to the straightening operation which I note, to which you charge no minutes under the title, "Ford cam shaper" at the bottom of page 19, and with respect to which you charge .50 minutes on the Melling cam lathe, I would like to ask you if you found any records of the Ford Company upon which you, as an accountant, thought were sufficiently reliable to rely upon as far as that information is concerned? A. Yes. I have the record, which is Exhibit 14, attached to Exhibit C, which is referred to as Mr. Marentette's time study, operation No. 12, straighten, .50 minutes.

Q. Now, did you make a direct comparison of the various operations as given in those two sheets, Exhibits 13 and 14, to determine whether or not they refer to the Ford model T shaft, 410 shaft? A. Well, the schedule, or the exhibit No. 14 is headed up model T-410.

Q. And, all the operations on those two sheets, I assume you have compared? A. Yes, I have.

(1937) Q. And, what difference was there, if any, between the two sheets so far as the number of operations was concerned? A. One operation was added to Exhibit 14.

Q. And, the difference between the two sheets is just exactly that of the addition of operation 12 for straightening? A. Well, you have to use the operation 13, "turn cam lathe," which is .86.

Q. You will find there the two differences, the operation sheet 13 containing all of the same operations with the exception of there being no operation listed between operation 11, "rough grind center bearing" and operation 12, which is marked, "shape cams." A. That is right. In other words, at that point the straightening operation was inserted on Exhibit 14, whereas it was not on Exhibit 13.

Q. And, also, the change in the middle of the operation from shape cams on the model T cam shaft shaper, and operation 13 on Exhibit 14, turn cam lathe? A. Yes. The very wording of the operation itself determines or tells you what machine was used on those two operations.

Q. Now, I don't think there is any particular dispute about the time which you ascribed to the shaper 1.20; that would be a production of 25 shafts an hour? A. 25 shafts an hour. I believe that is further established by testimony in the trial below, as well as testimony here in this present proceeding.

Q. Now, as to the time .86, from the Melling cam lathe; that, I understand, you employed as your second base figure in **(1938)** making your computations of costs? A. That is right.

Q. I would like to ask you now, witness, first, that specific figure of .86 was obtained by you, as I understand your testimony, from the Marentette stop-watch time study, Exhibit 14? A. That is true.

Q. And you used exactly the figure there given? A. That is right.

Q. .86? A. That is right.

Q. Now, did you have any other figure or, record, rather, which would tend to verify that particular figure? A. The so-called Payne report, which covers possibly a ten weeks' study in 1924, shows that while the machines were operating, that is actually turning, they got 35 and a fraction shafts per hour for one machine. Of course, that is just operating time alone. It is possible that some allowance should have been made for down time.

Q. I wish you would just refer to the Payne report, and where in the report you find record evidence that supports the statements you just made? A. Well, Exhibit W-1 is a summary that was introduced. That was introduced at a prior hearing, and if you add the hours on each of these weekly schedules, and also the number of pieces, you arrive at a total number of hours of 11330.75, and a total number of pieces of 404,440. And, making that division you get 35.69 pieces per hour; and, of course, **(1939)** you notice you are using just the hours run time.

Q. Actual running time? A. Actual running time.

Q. And how does that 35.69 pieces per hour, how does that compare with the figure, minute cost .86? A. Well, that compares quite accurately. In other words, one is 35 pieces per hour even, and this is 35.69.

Q. Did you know at the time you compared your Exhibit C that the Ford Company in its time study department computes on a basis of 80 per cent efficiency of a

machine; or, rather, 80 per cent running time? A. Yes, I knew that.

Q. And, it was your understanding, was it, that the .86 in the Marentette study was arrived at by making an allowance of that nature? A. Yes.

Q. What would you say as to whether, in view of the facts which have been brought out in testimony, as to whether or not you still consider your computation based on that .86 minute an accurate computation? A. I think that is as accurate as you can get it.

Q. Do you think that the use of that figure would tend to increase the cost or decrease the cost of operating the Walcott machines as compared to some of the other facts that have been brought to light, such as, for example, the Payne reports? A. Well, I think the figures I used would tend to decrease the loss, rather than increase the loss.

Q. That is, had you on the basis of the—let me ask this; **(1940)** the Payne report indicates on one of the sheets, I have forgotten which one, a notation in the handwriting of Mr. Wibel that the machines were 60 percent efficient. If you had taken that into consideration and taken 60 percent of the 35.69 pieces per hour, what would you then use as your computation?

The Master: Well, did Mr. Wibel testify he meant by that 60 per cent efficiency he was thinking of efficiency in the same light that the time study department was, and that is 80 per cent efficiency? I thought his testimony was that he was comparing the production with the guaranteed production of 45, which he claimed that the Walcott Company had guaranteed.

Mr. Farley: I don't think the figure would come out that way.

The Witness: I have a computation on that which shows that the actual efficiency based on the number of hours run, and the machine trouble and down time, would be approximately 65 per cent.

Mr. Farley: Let me state on that, if the Court please, in view of your question, Mr. Wibel's testimony—I definitely recall—was he arrived at the 60 percent efficiency by taking the number of hours that are totaled for the time when the machines were run-

ning—I might point it out to you while you have that in your hand, if you don't object (indicating)—he took the number of hours. You will note on the bottom of each sheet there is a horizontal line of figures, taking the sheet which is dated 9/19/24, that sheet has "Hours Run 50.7." That indicates the percentage **(1941)** of the time that the machine was running. The machine trouble was 34.3, and Mr. Wibel's testimony was that he eliminated the percentages in the two columns at the extreme right which totaled 13 percent, and gave the machines a little benefit of the doubt and said about 60 per cent no good, which is contained on that particular exhibit—I have forgotten the number of it. It don't seem to be marked.

That notation, for the clarity of the record, is marked on the sheet Exhibit No. W-14.

Q. (By Mr. Farley, continuing): Now, did you make any computation on that basis, Mr. Woehrle? A. Yes, I did.

Mr. Spohn: Will you read the question back again, now?

(The last question was read by the reporter.)

A. Well, to begin with, I think Mr. Wibel's computation is slightly in error. I think he used one machine there that was not assembled when he made his computation, so I have made another computation which shows that the actual efficiency was 64.544 percent.

Mr. Spohn: May I have that again?

A. 64.544 percent. Take the sheet that gives you August 11th to the 17th.

Mr. Farley: That is Exhibit W-2.

A. (Continuing): You will note the hours run total is 1108.75. Machine trouble is 422.25. I have excluded from that machine trouble the 120 hours that the machine was being set up. That is the very first machine at the top. I have eliminated that from my column called machine trouble, because I don't **(1942)** think we should penalize the machine for just setting it up.

Now, "tool trouble," there was no tool trouble on this, so I haven't included any factor like "No tools."

Later, on the next sheet, W-3, you will find there is a column for "Tool Trouble." Now, on that W-3, which is the August 18 to 22nd week, you will notice the total hours run is 979.75. Machine trouble is 671.25. I have used the amount of 551.25, which excludes the 120 hours for the setting up of the first machine.

Now, I have used 3½ minutes for tool trouble. Now, in making my computation of the percentage of efficiency, I have used the columns "Hours Run," "Machine Trouble," less the 120 hours each month for setting up one machine, and tool trouble, and those are the three that I took into consideration in figuring the efficiency of the machine, and I carried that computation through nine weeks, or to October 11th.

Q. I notice that, considering these sheets chronologically, that this first machine brass tag number, apparently while the first four sheets indicate that machine was out of commission for what they say "setting up," the next 5 sheets show that that particular machine was idle all the time, because it was not assembled for some purpose or other, and as I understand your computation, you have eliminated that machine which the sheet shows as idle? A. That is right.

Q. That is, you charge none of the time to that? A. That is right. I believe that is the difference between Mr. Wibel's computation and mine.

(1943) The Master: You say it should be the week of October 11?

A. Yes.

The Master: Why was that?

A. If you take a look at October 13—

Mr. Farley (Interposing): I think that gets you right to what I was saying. The last sheet, October 6 to October 11, shows that the first machine, brass tag 35472, was still in a not-assembled condition, is that right?

A. Yes. Now, the next sheet, they didn't take the study on all the machines. You see, we have only got 11 machines there, and I didn't think it would be logical to use only 11 machines, and in the next sheet they have only

got 9 machines. In the next sheet they have only got 7 machines. You see, this is the time in which they were starting to move the machines to the Rouge plant, so I only took the sheet on which all the machines were listed.

Mr. Spohn: Just one question, if you don't mind, on that. What number sheet did you take?

A. I took W-2 to W-10, inclusive.

Mr. Spohn: W-2 to W-10, inclusive.

The Master: As far as these last 3 weeks are concerned, in so far as the machines that are listed are taken into consideration, the relative amount of machine trouble does very sharply decrease, does it not?

A. I hadn't noticed. (Examining document.) Well, naturally it would, because you have got less machines. You mean the percentage.

The Master: The percentage. You will notice at the **(1944)** bottom of this week October 13 to the 18th, "Hours run 848"; "Machine trouble hours, 163.5"; that is considerably less than 20 per cent. It would be even a smaller percentage on the following week. And, the last week, the percentage is considerably under 20 per cent.

A. Of course, you have some tool trouble on the last one, which is 112. And, you have got—

The Master: Did you add the tool trouble in your computation, or did you simply take a relationship between the running hours and the machine trouble?

A. No, I added 42 hours for tool trouble. It is not a very important factor.

Q. (By Mr. Farley, continuing): As I understand it, you took the tool trouble in those sheets where the tool trouble was segregated from? A. That is right. I took the tool trouble. In other words, I added machine trouble and tool trouble, and the hours run, and took the percentage.

The Master: Well, this tool trouble on the last sheet is attributable to this machine, brass tag number 36848, where it states the motor was disconnected?

A. Yes. You can't very well penalize the machine for that, can you? As I said before, in making my comparison,

I used only the months where all the machines were available, because I thought that would be the fair method. Now, if we add those last three in, it is possible that we might get a different figure. How much difference, I don't know at this time.

The Master: It looks from a rough glance on this that **(1945)** these last 3 weeks the department was having the machines that were giving them the maximum amount of trouble removed. I notice the machines that had the high amount of machine trouble in the preceding weeks seem to have been taken out.

A. In other words, they gave the Rouge plant the worst ones.

Mr. Farley: I suppose the explanation of that would be quite obviously from these sheets they were —I think the survey apparently must have been made to study those machines before sending them to the Rouge plant; this is not evidence; just a conclusion I am making.

The Master: Let us take a brief recess.

(A recess was thereupon taken.)

Q. (By Mr. Farley, continuing): Without going into all of those figures, Mr. Woehrle, just what did the computation you made on that basis, which you just described, show as an output per hour for the machine, figuring 65 per cent efficiency? I believe that is what you did, didn't you? A. I actually didn't go any further than that to get an hourly rate, so many pieces are present. I just used that as a standard of comparison; the normal standard would be 80 percent, but this is only 65. In as much as I had a time study, I thought that would be the more accurate; at least, the one that would be fairer to use, so I used the one that figured about 80 per cent, which is Marentette's time study .86, which is Exhibit 14.

Q. That is, you figured 80 per cent of 65 as shown on this Payne report? A. No.

(1946) Q. I mean just as a check of your own information. A. In other words, I saw the 65 per cent was much less than the normal.

Q. And, you didn't employ that in any of your— A. (Interrupting): No, I didn't.

Q. You just made that computation for, you might say, a check on your own figures? A. That is right.

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(1957) Q. (By Mr. Farley): Now, we were discussing, Mr. Woehrle, your computation of the Melling cam lathes, and particularly the figure .86, which you state was based upon the Marentette time study dated October 8, 1924. Did you take into account at the time you made your computations the matter which has been raised by frequent objections by Mr. Spohn since then that this date October 8, 1924 —I think the objection was that it was not within the accounting period? A. Well, I don't think, personally, that it makes any difference whether it is in the accounting period or not; it is the operation of that type of machine under the conditions in department 410, and once you establish that fact, why, it doesn't make any difference. Just suppose an infringement of **(1958)** the patent had been issued on October 1st, 1924, instead of when it was, on June 15, 1925; that shouldn't alter it, the fact that the machine is without the accounting period.

Q. Well, I think I quite agree with you. Now, did you take into consideration at all at that time the length of time the machines had been running? A. I certainly did.

Q. And, did you take into consideration at all the number of shafts which had been produced on the machines in the interim between the purchase of the machine and the time when this time study was taken? A. Yes. I compiled the production, and I know it was producing more shafts at that time—or, by that time.

Q. You heard the testimony of Mr. John Schmidt here, did you not? A. I did.

Q. And, to the effect that he had changed these machines, these Walcott machines over from sody water, I think he said it, to oil. Do any of the records which you have consulted establish the date when that change was made? A. Yes. If you recall, these machinery valuation records kept by the accounting department, and identified by Mr. Missal, you will see that the oil pans or oil fixtures were installed during the summer of 1924.

Q. Could you refer to any one of those records, just for the record here, and just make reference to the type of

record it is, and where you find that? A. On Exhibit Y-27 there is a date of June 24, 1924, which adds a cost of $173.83 to the original cost of the machine, and on the reverse side of this same exhibit the explanation for that (1959) additional cost is this:

"Mill and electric installation cards and oiling system"; so that oiling system that Mr. Schmidt testified about occurred, or was changed, on June 24, 1927, according to the—

Q. (Interposing): A number of the other cards of the same group of Y exhibits show similar items for expense, and dates that run about the same, do they not? A. Yes, Y-28 shows June, 1924.

Q. I don't think it will be necessary to run through all those. A. In fact, Y-29 actually shows June, 1924. It is very specific. That is the mill installation charge.

Mr. Spohn: But, no oiling on that?

A. Apparently not. Y-30 shows June, 1924, and that includes the oiling system. So, I think you can go through all of them and you will find that the oiling systems were put in on June, 1924.

Q. (By Mr. Farley): All right. Now, suppose we go back to your Exhibit C, and I would like to refer you now to sheet 1 of that exhibit. The entire sheet, I understand, is denied or rejected by counsel for the plaintiffs. I will refer you first to your footnotes:

"(a) No cost records are available to show, by separate operations, the comparative power costs, tool costs, scrap losses or other incidental items."

As far as power costs are concerned, you have already stated that that would be a very insignificant sum comparatively? A. That is right.

(1960) Q. And, your testimony has been so far as tool cost was concerned, if the records had been available to show them, it is your opinion they would have shown slight increased cost of the Walcott machines over the shapers, basing that on the testimony? A. The testimony of other witnesses; yes, sir.

Q. And, scrap losses, what do you have to say about that? A. Well, that is a difficult item. I don't know of

any complete record on that. Naturally, a scrap loss would be for the whole department, or the whole 45 or 46 operations of the shaft. I don't think they would cut off at any particular operation. In other words, it would be too much to expect that they recorded every scrap loss on every operation. When they get to the end of the line, why, as you scrap, it is scrap, that is all there is to it.

Q. As a matter of fact, some of your cost summary cards do have some figure in for scrap losses? A. That is right. They do have some percentages for scrap, but you don't have any idea what it is caused by, what operation.

Q. Would you, as an accountant, recommend to the Ford Company that they should keep separate figures for scrap losses on each and every machine? A. No, I wouldn't recommend records. I think the foreman, by ferreting out the trouble, would remedy that before any records would be necessary to show it.

Q. How about your note, "b":

> "(b) The records for the Ford cam shapers, for the period in which these machines were used indicate only three instances of extraordinary repairs for overhauling; the **(1961)** amounts expended are not available."

What have you to say as to the correctness of that notation? A. Well, that statement is still correct. If you refer to the permanent inventory machine tool records, you will find that there are notations on three of the cards to the effect that there were extraordinary repairs on those three indicated machines. However, the amounts are not recorded thereon.

Q. And, now, about your note "c":

> "(c) Expenditures were made in 1928, 1929 and 1930 on 14 Melling cam lathes."

Did you have record evidence available for that? A. Yes. Those were all supported by factory work orders covering the detailed items of expense which were necessary to overhaul, I think, 13 of the Melling lathes.

Q. How about the next part of that, after the semicolon, "* * * the necessity for overhauling resulted principally from the use of the machines on model T-410 produc-

tion." A. Well, the reason I make that statement is this. We had machines in the department from early in 1924, so they operated for the latter part of 1924, 1925, 1926 and 1927; all are model T. In other words, possibly five years of use on the model T. Now, when we get into model A, we only operate some of them a short period before we overhaul them. So, I think that the greater, or almost all of the overhauling was required due to the wear on the production of the model T shafts.

Q. Do I understand, therefore, that you charge the entire cost of that overhauling to model T in this schedule under extraordinary repairs? **(1962)** A. That is right.

Q. Now, assume you had endeavored to split that up proportionately; that is, if you take the number of years the machines had operated, because of the fact you included that all, that expenditure all on model T production, you did not make any charge, as I understand it, on sheet 8 of your exhibit as originally prepared on the new substitute sheet 8 of Exhibit C' for extraordinary repairs? A. That is right. I did not make any charge to model A.

Q. And, how would making an allocation of that extraordinary repair charge of some $23,500 affect the end result, or net result? A. It would not change the loss to a profit in either of the cases. It would reduce the loss on the T somewhat, and increase the loss on the A. In other words, if it is desirable or practical to split that extraordinary repair charge, it probably could be done on a time basis or, perhaps, a production basis, but I don't believe it is material enough to attempt the computation.

Q. And, as far as your note "a" is concerned, that, perhaps, could have been amplified by a statement to the effect that these items would be so insignificant that they would not modify the figures materially one way or the other? A. Yes, in general; except for the tool cost. That might be considered a major item. And I think that has already been covered by Mr. Aptekar's testimony.

The Master: In regard to the shapers, and the question of the extraordinary repairs, isn't it possible that by the **(1963)** time the shapers were replaced with Walcott lathes, they were pretty well worn out, and if they continued to use them, the Ford Company would have to have made an expenditure similar to

that made on the Melling machines when they were used for model A production?

A. Yes, that is entirely true.

The Master: Shouldn't that be taken into consideration?

A. Well, if you remember my computation of depreciation, as these shapers became fully depreciated; in other words, after they had run their span of 10 years more or less—I think we figured ten and one-half—when these shapers were completely depreciated at the end of the ten years I discarded that old shaper, added a new one, and my depreciation computation at the latest available cost, and then continued to figure depreciation on that new cost as though we purchased a new shaper. Then carried that all the way through to the end of the accounting period.

Q. And, the new cost was considerably higher than the sum of the first cost, wasn't it? A. Yes, the figure I used was $5900 cost on the new shapers, whereas earlier we bought some for less than that.

Mr. Spohn: But, later there were some more expensive than that?

A. There were two built during a period of time when the costs were away sky high.

Mr. Spohn: Two were in excess of $10,000?

A. That is right. But, those were unusual, extraordinary. So, I felt that the only fair way to do would be to figure the last **(1964)** available cost. In other words, if we had a cost of $5900 in 1923, it is reasonable to assume we would have approximately the same cost in 1924, a year later.

Q. (By Mr. Farley): Those extraordinary costs of $10,000 or so, they were, if my memory serves me right, just at or around the peak of wartime production, 1917 or 1918, were they not?

Mr. Spohn: The record shows.

Mr. Farley: The record shows, I know.

A. The record shows the date.

Mr. Spohn: December, 1919.

A. Both of them were made in December, 1919, yes. I think that was still pretty high cost then, if I remember rightly; and, the amount of the last machine we purchased, in actual dollars, was $5,895.69, purchased on February 25, 1924. Now—

Mr. Spohn: Is that purchased, or, rather, made by the company itself, Mr. Woehrle?

A. Well, I think Arthur Coulton made those, I think. I am not sure, positively. I have a date of acquisition. That is the date we acquired it, anyway. So, you see, by 1924 the cost of the shaper was about $5900; and, if we added any more, it is reasonable to assume they would be approximately that same cost. In fact, the last four machines we bought in 1923 to 1924 would average $5900; the last four machines we bought. Does that make it clear just why we don't need any extraordinary repairs outside of what we already have?

The Master: Yes. I understand your theory there.

Q. (By Mr. Farley, continuing): You acknowledge, of course, as your sheet 1 clearly shows, a higher depreciation cost on the shapers through the period of time than you did on the Walcott **(1965)** machines? A. Yes. Depreciation expense on the shapers exceeded the depreciation expense on the Melling cam lathe due to the higher cost. That includes those two machines bought at $10,000 apiece, also, by the way. The figures are on the total actual cost. If we bought those machines at any other dates, say, the figures before or the figures later, we would probably have used a cost of around $6,000.

Q. Now, you have inserted a substitute sheet for your sheet—no, your schedule 1, sheet 2 of Exhibit C remains unchanged? A. That is right.

Q. I take it, then, that in your opinion the computations and figures given on those pages are, in your opinion, accurate? A. That is right. You might go all the way over including page 7.

Q. And that same answer would apply to each of these sheets? A. That is right.

Q. And, as to those figures contained in there, they are supported by available records of the Ford Company,

which you consulted? A. Available records or testimony of witnesses preceding being here.

Q. As to those particular computations how many, if any of them, or what portion of them, are supported by records as against those which are supported by testimony, or of testimony? A. I believe with the exception of maintenance repairs based upon the testimony of witnesses to the effect that four men maintained on the Mellings on two shifts, four men each shift, against two men on the shapers, I believe with the exception of those facts, that all other data is based upon records. I may be mistaken, but it is my recollection that I have had records for everything else.

(1966) Q. And, then, those sheets, including the schedule 1, sheet 1, are all supported, with the exception of the maintenance, all supported by available records? A. That is right.

Q. Suppose you had eliminated the maintenance repairs on the basis there was no record to support it, how would that affect the end figure? A. You would still—you would have a reduction in the loss of some six thousand-odd dollars, which would reduce the loss to a sum figure of around $29,000.

Q. Going now to your schedule 2, that has all been supplanted by the Exhibit C' that you introduced last night? A. That is right; C'.

Q. And the same with schedule 3? A. That is right.

Q. I wish you would refer, now, Mr. Woehrle, to sheet 18 of your original schedule 1, or rather, your original Exhibit C; you leave that sheet in its original form, no change has been made? A. No changes.

Q. Now, I notice on my copy that I have marked 2 B and C have been denied or rejected by the plaintiffs. Would you change any of the data given there in view of the rejection of that sheet by the plaintiffs, or do you think it should be changed?

Mr. Spohn: The fact is the witness hasn't changed it.

A. No, I haven't changed it. The fact is that is a determination of the correct standard of comparison to use, I believe, in most cases, and that is a matter which we are attempting to **(1967)** decide in this case, I believe.

I am merely using the standard which counsel for the defendant is contending should be used.

Q. And which I instructed you to use? A. That is right.

Q. Of course, that would be true with respect to the denial or rejection of your paragraph 3. Of course, as to the denial of the latter part of paragraph 4, that is a matter, I suppose, more for the Court to decide, and I assume the denial merely goes with it where it is constructed in accordance with the original drawings of the White Motor Company. But, as to the last sentence there, of your paragraph, "no Ford cam shapers such as used by the defendant Ford Motor Company are in existence in so far as any present knowledge of defendant is concerned," are there any records available which support that statement? A. Yes. The permanent inventory machine tools shows that all of the Ford cam shapers were scrapped, and by that is meant actually disposed of in some way, shape or form in 1925 or 1926.

Q. Now, I think we already discussed your computation of page 19, description and means used in computing schedule 1. You just went over that. And, you have testified concerning this first paragraph on page 20. As to the second paragraph, that was also discussed by you and discussed by Mr. Marentette, the straightening operation. In view of just the general question there, in view of the testimony and the further check it is still your position that that is an accurate **(1968)** statement? A. That is right.

Mr. Spohn: What is an accurate statement?

Mr. Farley: The statements contained in the first four paragraphs of page 20. I think we already have fairly well covered depreciation as you described on pages 20 and 21; also, maintenance and repairs as described on pages 21 and 22; and, as to pages 23 and 24, we will put substitute sheets in for those which you discussed last night.

As to page 25, that is the discussion of depreciation continued from your new page 24 on Ford cam shapers, and I think you pretty well covered that with the discussion you just now had with the Master. The same thing is true with maintenance as covered on pages—the bottom of page 25 and page 26.

Now, as to page 27, that has to do or, rather, you substituted a new sheet for that, did you not?

A. That is right.

Q. And, the same is true with respect to page 28. How about page 29 of the original report; paragraph 7, operation sheets for making the model T are attached to, marked Exhibits 13, 14 and 15.

"(b) Model A cam shafts is attached hereto marked Exhibit 16."

"(c) Tractor cam shafts—is attached hereto marked Exhibit 17."

What have you to say about those statements? A. Well, those statements, as they are there, are true. They are **(1969)** operation sheets, and I don't think the page should be changed at this date. I think testimony has explained in detail the various operation sheets there.

* * * * *

(1976) Q. Well, I don't know whether it was correct or not, but it seemed to me, I had the impression that while you had answered that question correctly according to what the sheet shows, that later on, three or four sentences later, you inadvertently twisted it the other way around. A. Well, if I did, I will repeat and state that the direct labor cost of three operations on the shapers,—and that is column 5,—taking them month by month, in no period do those costs exceed the costs of direct labor on three operations on the Melling cam lathes as set forth in column 8. And whether you take it month by month, year by year, or the total period, would not change that relationship.

Q. Of course, in that respect the sheet fully speaks for itself anyhow? A. That is right. Now, may I make a statement, on page 23, while we are talking about that proration I made back there? I have got another theory on that, if it is permissible to give it. Page 24.

Q. That is on Exhibit C? A. C'.

Q. C', yes. A. You remember when I prepared my first statement of account, Exhibit C, I used a pro-ration method to arrive at the minute cost for shaping the model A shaft on the Ford cam (1977) shaper. And I made that pro-ration on this basis: In other words, it took so many minutes to turn the "T" shaft on the Mellings, Melling cam lathes, and it also took slightly more time to turn the "A" shaft on the Melling machines.

Now, that proportion that it took the Melling machines to turn the "T" shaft as compared with the "A" shaft, I applied that proportion to the shaper operation on the Ford cam shaper, and applied that proportion to the 1.20 minutes, the actual time for shaping the model T cam shafts on the Ford cam shaper. And that comparison method would give me 1.40 minutes for the shaping of the "A" shafts. So you can see that it is not very far off from the figure I actually used here of 1.3755.

Mr. Spohn: Mr. Woehrle, may I have that figure again? 1.4—

A. 40.

Mr. Spohn: 1.440?

A. No, just 1.40.

Mr. Spohn: All right.

Q. (By Mr. Farley): As I understand that statement of yours is that in your Exhibit C you had established a proportionate increased time for the turning of the model A shafts as compared with the model T shafts on the Walcott machine? A. That is right.

Q. And you got that proportionate or percentage increase from those two figures? A. That is right.

Q. And you used that same percentage increase in your first (1978) computation— A. Exhibit C.

Q. —to compare model A shaper operation with model A Walcott machine operation; that is correct, isn't it? A. The "A" shaper with the "T" shaper.

Q. Yes, model A shaper— A. For the "T" shaft. In other words, the increased comparison of the "T" to the "A" on the shaper.

Q. Yes. But you got that proportionate increase from certain figures you had concerning the Walcott machines? A. That is right.

Q. Then you used that same proportionate increase for applying it to the 25 shafts, known 25 shafts per hour on the shaper, and from that got the—really a proportionate decrease, it was, wasn't it? A. Decrease of time; proportionate increase of shafts per hour.

Q. That is the way you figured it in your first computation? A. That is right.

Q. And whereas in the second computation in your Exhibit C', you employed what might be termed the perimeter method, which is used in the computation made by Mr. Pioch in Defendant's Exhibit 264? A. That is right.

Q. And now your statement is that by either of the two methods you get a very close or a comparable result? A. That is right.

Q. Is that right? A. That is right. The approximate difference—I mean the difference is very small.

(1979) Q. What would it amount to in the end figure? A. In dollars and cents?

Q. Yes, dollars and cents. A. Before I changed it, I think it made a difference of some $1500.

Q. Increase or decrease? A. It increased the loss $1500 by using this method.

Q. By using the— A. C' method; the method used in C'.

Q. That is the same general type of method as used by Moise in schedule Z which he prepared? A. Yes, I think that would compare favorably with his periphery method.

Q. Now, I think that about covers all of the material insofar as your Exhibit C and C' is concerned, unless you have further comments or thoughts of anything you think would require any additional explaining. A. I can't think of anything else right now.

Q. You have prepared certain other computations? A. That is right.

Q. Have you not? A. That is right.

* * * * *

(1980) Q. (By Mr. Farley): Now, what, if any other, computations have you prepared, Mr. Woehrle? A. (Witness produces a document.)

Mr. Farley: Mark this an exhibit.

(A document was thereupon marked Exhibit 301 by the reporter.)

Mr. Farley: I don't think I made the offer. The substitute sheets for Exhibit C were marked Exhibit C'. Now, I offer that as Exhibit C'.

The Master: I will admit it.

Mr. Spohn: Will you withhold your ruling on that until **(1981)** such time as we have had an opportunity to cross examine the witness?

The Master: Well, yes, if you want me to.

Q. (By Mr. Farley): Now, in connection with this other or additional computation which you have produced and which has been marked in evidence as Exhibit 301, I think I would like to have a few preliminary questions on that. You were present, Mr. Woehrle, when Mr. Moise testified on behalf of the plaintiffs? A. I was.

Q. And you were furnished with a copy of his Exhibit Z, as well as his Exhibit Z', substitute sheets? A. I was.

Q. Now, will you proceed then to describe the computations that you have in Exhibit 301? A. Referring to the facing sheet or the first sheet under the heading, "Changes made," those changes are the only changes I made in the standards which Mr. Moise used in his original Exhibit Z, or Z'. In other words, I have made the computations in exactly the same manner which Mr. Moise made in his original exhibits, and the only changes I have made are listed here, and I will read them off:

No. 1, substitution of Ford cam shaper as a standard of comparison in place of the Landis grinder for computing "A-6250" and "F-446" cost.

No. 2, addition to the cost of the straightening operation to the turning operation on the Melling cam lathe for all three types of shafts.

And, No. 3, substitution of the Pioch cam mill as the **(1982)** standard of comparison in place of the Landis grinder for computing additional losses "based upon rejection of claims made by defendant, but not substantiated by records supplied."

Q. In connection with that quotation, or, rather, the use of the quotation marks, I note that throughout these pages which you have typed, particularly the page which is marked "Page 1" on this Exhibit 301, that there are a number of places where the text is quoted. Now, in that connection I want to ask you about the note that appears on the first page of your Exhibit 301. A. That note reads as follows: "The reproduction herein of certain text, copied exactly from Plaintiff's Exhibit Z, is not to be taken as an admission of the correctness thereof."

Q. That is, the correctness of the text? A. Yes.

Q. In the original Moise report? A. That is right.

Q. Now, will you proceed to describe this computation? A. Well, I have tried to set it up exactly in the same language and the same form as Exhibit Z and Z'. Now, I think it would be better if we started at page 6, where we show a number of shafts per hour and the method in which we have arrived at the comparative starting figures. And down at the bottom of page 6, referring to the notation, note "A," and that refers to the model T operations on the Ford cam shaper, reads as follows:

> "Based on production of 25 per machine hour, or 50 per man hour (pages 205, 212, 222 and 277 of printed **(1983)** record of appeal)."

Q. Do you have before you the Moise report, Exhibit Z? A. No, but I know what that is about—I think that is the same wording used by Mr. Moise.

Q. In other words, in this sheet 6 you used precisely the same language as contained in Mr. Moise's report under his note A on the corresponding page, page 6 of his? A. That is right. Now, that 25 per machine hour or 50 per man hour is carried up in the body of the schedule of page 6 as .02 man hours per shaft. That happens to be—

Q. The substitute page 6 which is contained in Exhibit C' shows precisely the same language and the same terminology as you have used on this sheet of yours? A. That is right.

Q. And that is true for each one of the notes, A, B, C, D, E and F? A. Except for additions of straightening in cases and differences in computation. And I will set those forth as we go along.

Take B, for instance, that is based on production of 37½ per machine hour, or 75 per man hour, taken from pages 212 and 223 of printed record of appeal.

Q. Just to that point, then, that is exactly the same exhibit as used in Mr. Moise's report? A. That is right.

Q. Then you have added— A. Now, I add ".5 minutes for straightening."

Q. Your note adds "plus .5 minutes for straightening." A. That is right.

Q. Then what else do you include in your note? **(1984)** A. I include the total Exhibit 14 of Defendant's Exhibit C.

Q. Which, in your opinion, substantiates the inclusion of the .5 minutes for straightening? A. .5 minutes for straightening, that is right.

Q. Would it be simpler, then, to take that at that point—I think it probably would; go ahead in your own way. A. Refer to B up in the body of the schedule on page 6, we get a time of .02166 man hours per shaft.

Q. And that B note is in the first figure, rather, appears at the top of the 4th column from the right? A. Yes, under "Melling cam lathe computations."

Q. And under "Man hours"—I see. A. That is right.

Q. And the note B refers to each one of those figures, which are the same there, .02166? A. Yes. Now, the mathematical computation of that is quite simple, and I don't think I will go into that at this time. If there is any question later on how it is figured, why, I will explain.

Q. I think it is better, perhaps, at this instance, to make the record clear on that right now. As I understood the Moise report originally you take sheet 6 of Exhibit Z; in place of the figure .02166, appearing in each of his sheets 6, you have the figure .01333. A. Yes, .01333 is the man hours.

Q. Per shaft. A. Per shaft. Based upon one man operating two machines, turning out 75 shafts.

Q. Which is obtained by dividing 37½ per hour into 60—let me see, how is that? A. Let me—

(1985) Q. All right, you explain that. A. You get 75 shafts per hour, one man operating two machines. One hour divided by 75 gives you .01333 man hours per shaft.

Q. That is right. A. Now, I have added to that time a half a minute for straightening. Now, a half a minute for straightening is .50 minutes, divided by 60 min-

utes, which equals .00833 man hours. Add the two together, that is, add .01333 and .00833, and you get a total of .02166 man hours per shaft. That includes the straightening operation.

Q. Then the figure you get there is the same figure which Mr. Moise pencilled in on his original sheet 6 of Exhibit C, .02166? A. That is right.

Q. All right. A. At the prior proceedings. Now, let's take up notes C and D.

> C. "Based on production of 15.65 per machine hour, or 31.30 per man hour."

You will note this is different from Mr. Moise's report. And that is calculated from "A" above. Now, "A" above is the shaper operation on the model T, "due weight being given to larger area of F-446." And I refer to Plaintiff's Exhibit C, an addition which I have made to Plaintiff's Exhibit C, which is a schedule in Exhibit Z or Z'.

Q. C? A. No, that is in Z or Z'. And I refer to page 12-A attached hereto.

Q. Are you sure you have got those exhibit numbers right there, Z or Z'? A. That is right.

(1986) Mr. Spohn: What is the reference to C, then?

A. It is Exhibit C in Plaintiff's Exhibit Z, which is page 12,—

Q. (By Mr. Farley): Then the notation here should be "See addition to Plaintiff's Exhibit Z," should it not? A. No, Plaintiff's Exhibit C. We are right in this report Z—we are right in the report Z; we are talking about report Z right now. Turn to page 12.

Q. Of this thing you are now on? A. Moise report, page 12. That is Exhibit C.

Q. Oh, I see; yes, that is Exhibit C, forming a part of Plaintiff's Exhibit Z. A. That is right.

Q. I see. A. Quite confusing, but that is true, nevertheless.

Q. I see. All right. A. Let's refer to Plaintiff's Exhibit C, attached to Exhibit Z.

Q. That being page 12 of Exhibit Z? A. Page 12, that is right.

Q. Now, let me see, is there any substitute page? As we are discussing these, we better look. Yes, there is also a substitute page 12, and substitute Exhibit C in the—
A. In Z'.

Q. In Z'. All right. A. I think to save time, let's use Z' altogether.

Q. Where there is a substitute page? A. Where there is a substitute page. Then we won't have to refer to both of them. Now, what I have done in Defendant's Exhibit 301 is merely add another page marked page 12-A. That is the last page in Exhibit 301. And I have referred to the table **(1987)** as "H," since plaintiff ended with the letter "G" on Exhibit Z'.

Q. You have added an additional table? A. I have added an additional table.

Q. Two additional tables, in fact? A. Two additional tables.

Q. All right. A. Now, the table, I referred to in note C on page 6 of Exhibit 301, is table "I," where we convert the production of the model T shafts on the Ford cam shapers to the Model F shafts on the Ford cam shapers; using the same method as set forth in Plaintiff's Exhibit Z or Z', which is the area method. Now, take a look at table "I," and we might as well figure together here. I will read it, as follows:

> "Production of T-410 cam shafts on Ford cam shaper determined to be 25 per hour. Non-turning and turning time would be:
>
> Machining: .72
> 1.68
>
> which is a total of 2.40."

That gives you 25 shafts per hour machining time on the shaper for the model T shaft.

Q. Now, I notice that you have used the expression, "Non-turning and turning time"; where did you get that from? You got that from page 12 of the Moise reports, is that correct? A. That is right. In other words, I copied figure for figure from the schedule C of Exhibit Z, prepared by Mr. Moise. And I have not departed from his method of computation.

Q. That is, assuming the correctness of the Moise method of figuring as taking a White time study as the basis for the non-turning time, you have used precisely the same figure as employed by Mr. **(1988)** Moise, of .72 for handling time, is that right? A. That is right. In other words, I am merely assuming that the figures given in Exhibit Z or Z' are correct. That is an assumption only.

Q. There is no table of this type or comparable to this in the Moise report, because no computation was made therein of the cam shaft shaper, as a basis of comparison for the A-6250 shafts? A. For the F-446 shafts or A-6250.

Q. Yes. A. We are talking about the F-446 now.

Q. Your table I refers to the F-446 shaft? A. That is right.

Q. And your table "H" refers to A-6250 shaft? A. That is right.

Q. Very well. Then I think with that explanation your table is rather self-explanatory, as it gives you, by using the Moise method of calculation, an output of 45.35 shafts per hour, per man hour, for model A production on the shaper? A. That is right.

Q. As shown in table H; and 31.30 shafts per hour for production on model F shafts on the shaper? A. That is right. Those are both man-hours. In other words, one man operating two machines. I might state that the area method used in Mr. Moise's report—referring to page 11, you will note that for the model A—

Q. (Interposing): Page 11 of that Z', or of the original? A. Either one.

Q. All right. **(1989)** A. The area ratios for the T, using T as the base—in other words, 1.00, then using the area increase for the A, which is 1.14640, and the area method for F-446, which is 1.85287, those area ratios have been used in table H and table I, page 12-A of Exhibit 301 about which we were talking.

Q. In other words, you have used, as I understand it, identically the same area ratios as employed by Mr. Moise in his computation? A. That is right. I might state that had I used his periphery method I would have increased the resulting loss of the various shafts affected. So I used the area method, which I think is more conservative.

Now, I think we will refer back to page 6 of Exhibit 301, using in footnote C the 15.65 shafts per man-hour or 31.30 shafts per man-hour as taken from page 12-A. That is on the F-446 shafts.

Now, you will note that that is placed in the body of the schedule on page 6 as .03194 man-hours per shaft.

Q. That is in the 5th column under the main head of "Ford cam shaft shaper" and under the column head "Man-hours per shaft"? A. That is right.

Q. Very well. Proceed. A. Footnote D is based on production of 25 per machine hour or 50 per man-hour, and that is taken from page 256 of printed record of appeal. That is as far as Mr. Moise's report goes, and I have added:

"Plus 1.15 minutes for straightening."

And I refer to Defendant's Exhibit 215, which is a time study **(1990)** for the tractor prepared at the English plant of the Ford Motor Company and identified by Mr. Klopsic in testimony in this proceeding. Now, you will note that D is placed in the body of the page 6, 4th column from the right, and the man-hours per shaft is .03916. Do you believe it necessary for me to show the detailed computations of each of these?

Q. I shouldn't think so. I think we are all familiar with how those various—your Honor remembers how these things were computed?

The Master: Yes.

A. It is merely a mathematical computation. As long as you get your minutes and seconds and hours.

Q. I am sure Mr. Moise can probably understand them. A. Now, footnote E is based on production of 22.68 per machine hour or 45.35 per man-hour, calculated from A above; and that is the T comparison on the shaper, due weight being given to larger area of A-6250. And I again refer to Plaintiff's Exhibit C, attached to Exhibit Z or Z', which is reproduced in Exhibit 301 here as page 12-A. And that is the model A comparison; table H, you will note that the shafts per machine hour are 22.68; shafts per man-hour, 45.35. And those are the identical figures used in footnote E on page 6 of Exhibit 301.

Now, that E note is placed up in the body of page 6 for A production on the shaper, and it is the 5th column

from the left and is .02205. Now, take footnote F, based on production of 34.706 per machine hour or 69.412 per man-hour, **(1991)** calculated from B above; and B above is the operation of the Melling lathe on the T shaft, due weight being given to larger area of A-6250. See Plaintiff's Exhibit C, which is in Exhibit Z', page 12, table E at the top of the page. Those same production figures per hour are given in that table,—or, computed in that table.

Then I have added, "Plus .60 minutes for straightening."

And I refer you to Defendant's further statement of account, which is Exhibit C on page 23—I better refer to our exhibit; further statement of account, Exhibit C', page 23.

Q. Yes. I think you better change that; Exhibit C'. A. Page 23. It is Defendant's further statement of account as amended, which is Exhibit C'. And remember that is the straightening operation for the model A shaft as taken from time study or engineering operation sheet prepared and attached to Exhibit C' as Exhibit No. 18. And that, if you remember, is the so-called Autostroy operation sheet. Now, if you take footnote F for the figures and refer to the bottom of page 6, 4th column from the right, you get the amount of .02441; that is the man-hours per shaft on the Melling cam lathe on the A shaft.

Q. And in all of these you have used the same system as Mr. Moise, of including the full burden rate, have you not? A. That is right.

Q. Now, you have employed the detail figures as obtained on page 6, and employed them in the further computation on what next page? A. Pages 5, 4 and 3 are merely the dollar amounts based upon the **(1992)** figures obtained from page 6. In other words, applying the production number of shafts to the cost of the shaping operation on the Ford cam shapers compared with the cost of turning the cam shafts on the Melling cam lathe, using throughout the exact method of arriving at the annual productive labor figures and the annual overhead figures as prepared by Mr. Moise in his original Exhibit Z.

Q. I assume it is not necessary to go through all the computation and the meaning of the figures on pages 3, 4 and 5 in view of the testimony that has already been

given about the system and Mr. Moise's explanation of his system. So I refer you then to your page 1, for the summation of the figures, using this Moise method, as you might call it. A. On page 1, which is headed "Losses sustained by Ford Motor Company through use of Melling cam lathe for rough-turning cams on cam shafts T-410, A-6250 and F-446, from June 16th, 1925, to date use of these machines was abandoned."

Now, the minimum loss from June 16, 1925, to February 3, 1931, based upon production claimed by defendant or admitted by defendant's employees is $35,921.67, which is the total amount obtained from page 3.

Q. That is the same language as used in page 1 of Mr. Moise's original Z report and his Z-1 report, and I think there is still a Z-2, a substitute page for this, except that you have changed the word "savings" to "losses" as appeared in the heading, the first word; and the second word in the 1st paragraph of your sheet reads, "Minimum loss" instead of "Minimum savings"? **(1993)** A. That is right.

Q. You substituted the word "loss" or "losses" for "saving" or "savings," wherever that appears, but otherwise you have followed the language used by Mr. Moise? A. That is right.

Q. All right. A. In fact, I have quotation marks where the quotations are taken word for word from Mr. Moise's report.

Q. And I think your computations there speak pretty well for themselves, and you get the figure $35,921.00 as your top figure, at the top of the page; and then just explain briefly these other three sums of $644.47 and so on, will you, please? A. The second section of this page is headed up "Additional losses based upon rejection of claims made by defendant but not substantiated by record supplied."

Q. As a matter of recollection, that part of Mr. Moise's report was all based upon the assumption that the sending of the machines to Track 297 did not put them out of production? A. I believe that is right, yes.

Q. And these figures that you obtained, also based on that same assumption, show that instead of any additional gains, if the company had continued to use the machines for that additional period, there would have been a loss of

$644.47 for the period of May 16 to December 30, and then for the period January 1 to February 3 another loss of $257.83, making a total of $902.30; is that right? A. That is right.

• • • • •

(1999) Q. (By Mr. Farley): All right, if you will proceed, Mr. Woehrle, with the description of Exhibit 302? A. The changes made on Exhibit 302 are as follows—in other words, the change made from the Exhibits Z or Z' to the computations made here in Exhibit 302.

The first change, substitution of Ford cam shapers as standard of comparison in place of the Landis grinder for computing A-6250 and F-446 costs.

No. 2, inclusion of the straightening operation in the computation of the costs of machining on Melling cam lathe for all three types of shafts.

3. Substitution of production of 35 model T-410 cam shafts per machine hour on Melling cam lathe in place of 37½ per hour.

Substitution of production of 30 model A-6250 per machine hour on the Melling cam lathe in place of 34.706 per hour.

5. Substitution of production of 14.27 model F-446 cam **(2000)** shafts per machine hour on Melling cam lathe in place of 25 per hour.

6. Substitution of the Pioch cam mill as the standard of comparison in place of the Landis grinder for computing additional losses "based upon rejection of claims made by defendant but not substantiated by records supplied." Then I will refer to the note at the bottom of the page.

Q. That is all as stated on page one of your Exhibit, of the first page of your Exhibit? A. That is on the facing sheet of Exhibit 302.

Q. Yes. A. Also the footnote reads as follows: "The reproduction herein of certain text copied exactly from Plaintiff's Exhibit Z is not to be taken as an admission of the correctness thereof."

Now, I think it would be better to refer back to page 12-A, you will notice that 12-A is identical with page 12-A of Exhibit 301. Page 12-A of Exhibit 302 is identical with page 12-A of Exhibit 301.

Q. All right. A. I used table H and table I on this page,—at least, I present table H and table I. However, for the present computation I have used only table I. In other words, table H may be ignored. I merely put table H in because it had previously been necessary for Exhibit 301. It is, as I said, identical with 12-A of Exhibit 301; hence I don't think it is necessary to go into the method of computation.

Q. That is all right. I suppose next you would prefer to start on page 6. **(2001)** A. Page 6. I think I will show you the difference in page 6; at least, it would be very much clearer. Footnote A on the bottom of page 6, Exhibit 302, reads as follows:

> "Based on production of 25 per machine hour or 50 per man hour (see Exhibit 13 of Defendant's further statement of account)."

Recall that is the copy of the time study copied from Spencer Libby's notebook. That is record evidence and I have used that in place of what Mr. Moise used in his report Exhibit Z' where he says he obtained his record from printed record of appeal, testimony of witnesses.

Q. The figure I have reads the same. A. The figure reads the same.

Q. All right. A. Footnote B, "Based on production of 35 per machine hour or 70 per man-hour, plus 5 minutes for straightening operation."

The Master: .5 minutes?

A. Pardon; .5 minutes. "(See Exhibit 14 of Defendant's further statement of account and Payne report.)" If you remember, that Exhibit 14 is the time study taken in 1924 by Mr. Marentette, and the times are .86 for the turning operation on the lathe and .5 minutes for the straightening operation.

Q. The "Payne report"— A. (Interrupting): We have discussed that.

Q. (Continuing): —is the one that gives 35 shafts per hour? A. 35 and a fraction, yes.

Q. Exhibit 14, however, gives you record evidence concerning the .5 of a minute for the straightening operation? **(2002)** A. Yes.

Q. All right, go ahead. A. Footnote, "Based on production of 15.65 per machine hour or 31.30 per man-hour (calculated from A above)."

That is the model F shaft on the shaper.

"Due weight being given to larger area of F-446. See addition to Plaintiff's Exhibit C which is attached to Exhibit Z and Z', and which is page 12-A of the present Exhibit 302 which we are discussing."

Q. Then that 15.65 is the same thing you discussed when you were discussing Exhibit 301? A. That is right. Same computation based on the area method.

Q. Go ahead. A. Footnote D, "based on production of 14.27 per machine hour or 28.54 per man-hour plus 1.15 minutes for straightening operation (see Defendant's Exhibit 215)," and that exhibit is the operation sheet prepared by the English company of the Ford Motor Company, English branch.

Q. Have you got that handy, Exhibit 215? A. Yes, I think I have.

Mr. Farley: I think, for the purpose of refreshing the Court's recollection, we might let him look at it at this time.

Mr. Spohn: It is 214, isn't it? (Exhibit handed to the Master.)

A. 215 is the Exhibit which Mr. Klopsic identified and explained here in these proceedings some time ago.

Q. All right. A. Footnote E: "Based on production of 21.81 per machine hour or **(2003)** 43.62 per man-hour. See Defendant's further statement of account, page 23, as amended," which is Exhibit C'. Now, that is based upon the computation, using the perimeter method, if you will recall, stepping up the time for the shaping of the model A shaft on the Ford cam shaper, using as the basis Mr. William Pioch's figures or computations of 25.3 seconds for the T cycle on the shaper, as compared with 29 seconds on the A shaft on the shaper. It would figure out to 1.3755 for the turning operation, plus 1.15 minutes for the straightening, gives you the total amount of .02293, which is in the body of page 6, marked E.

Q. .02296? A. No, wait; pardon me.

Q. The sheet I have says .02293 opposite your footnote E. A. Well, that is the number of minutes—in other words, 1.3755 minutes, divided by 60 minutes will give you .02293 hours, man-hours per shaft. There is no straightening operation in there. I was reading from footnote D and in error at that time. So if you have a minute cost of 1.3755, you get an hourly cost of .02293.

Now, let us take footnote F, based on production of 30 per machine hour or 60 per man-hour, plus .60 minutes for straightening.

Q. On the production of 30 machine hours, the production figure on the Melling machine? A. That is on the Melling machine on the A shaft using the source of information the Exhibit 18 attached to Defendant's Exhibit C', which, in other words, is that Autostroy record.

(2004) Q. All right. A. The .60 minutes for straightening is also obtained from that same record, and that is explained in defendant's further statement of account, page 23, as amended, which is Exhibit C'.

Now, with those adjustments applied to the man-hours per shaft, when they are applied to the same direct labor amounts as determined by Mr. Moise in Exhibit Z and Z', and also the same burden percentages as determined in Exhibit Z and Z', you get the dollar amounts as shown on pages 3, 4 and 5, page 3 being the total cost, page 4 being the productive labor cost, and page 5 being the burden cost.

Q. That is all just in the same method of computation as used by Mr. Moise? A. That is right.

Q. All right. Now, will you go to your summarization; I guess that would be next in order. A. Well, page 3 of this Exhibit 302 gives a loss of $64,128.08 for the period from June 15, 1925, to February 3, 1931; that is, June 16, 1925, to February 3, 1931. That is the whole length of our accounting period here. And that amount is carried forward to page 1, under the heading, "Minimum loss from June 16, 1925, to February 3, 1931." Now, the second section of this page 1 is determined similarly to the page 1 of Exhibit 301. In other words, using as a standard of comparison the Pioch machine instead of the Landis grinder when comparing the operations of the Melling cam lathe. In other words, substituted the Pioch machine in place of the grinder, and comparing those amounts with the Melling cam lathes, ascribing 42 shafts an hour to the Pioch ma-

chine. And assuming that when **(2004½)** the first Pioch machine was put on production in May, 1930, May 16th, and figuring to the end of the year, December 31, 1930, we arrived at a loss of $1,224.89 for that period. That is using the same production which was used by Mr. Moise in Exhibit Z′, and I think also used by the defendant in Exhibit C. Then the period from January 1, 1931, to February 3, 1931, gives us a loss of $489.98, and that is based on a production of 36,960 model A shafts.

(2005) Now, that takes us up to the end of the accounting period, February 3, 1931. From that date on, Mr. Moise figured the loss if we had used grinders from that date to July 31, 1931.

In place of the grinder, we have substituted the Pioch machine, and computing from February 4, 1931, to July 31, 1931 we have determined the loss to be $5768.88, due to the fact that we used Melling cam lathes instead of Pioch machines. That is, of course, based on the assumption that we did use the Melling cam lathes. Giving us a grand total loss of $71,607.83.

Q. Is there anything more that you wanted to explain in connection with those sheets? A. No, I believe not.

Mr. Farley: Are they all clear to you, your Honor?
The Master: Yes.

Q. I note, of course, that throughout these exhibits 301 and 302 you have used the full burden rate, and while we discussed that, it seems to me, fairly thoroughly this morning, I was just wondering whether there is any other comment you had to make on that. A. Well, perhaps I should have put a footnote on these Exhibits 301 and 302 to the effect that it was our contention that a total burden figure, burden percentage figure applied to direct labor, is not the correct method to use when you are trying to determine the savings of one machine over the other. In other words, we are here to try to determine the savings, as I understand, from one machine to the other, and if we know beforehand, before we start our computation that certain of the elements of cost would not be required in a savings **(2006)** computation method of any kind—by that I mean, if one washed out against the other—it seems to me there is no need for even trying to arrive at a cost for those various elements. And I tried to explain this morning

that there were numerous cost elements which are included in the overhead, total burden overhead figure, or rate, which I would not consider in making any comparison with one machine with another.

Q. Would you say that the situation here differs in any respect from what might be termed ordinary accounting practice? What I have in mind is this, that generally speaking, if you were put on the job of determining the profits, let us say, of an ordinary merchandising establishment, or even the profits, taken generally, of the Ford Motor Company insofar as they referred to sales of cars, then it would under ordinary accounting practice be necessary to take into account all of these burden rates. A. All of the elements of burden.

Mr. Spohn: Will you read the question back? I didn't get it.

(Question and answer thereupon repeated by the reporter.)

Q. (By Mr. Farley): The question could be asked, as an accountant you can't get profits without taking into consideration burden and inventory and all that sort of thing; I was just wondering whether in that respect you consider the situation in the inquiry you are here directed to make is any different in that respect than what you might ordinarily be confronted with as an accountant? A. Vastly different, yes.

* * * * *

(2028) WILLIAM F. PIOCH was thereupon recalled as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Farley.

Q. You are the same Mr. Pioch who testified here before? A. Yes, sir.

* * * * *

(2029) Q. We had Mr. Weyl, of Mr. Shelldrick's department on the stand here a couple of days ago, and he produced this drawing which is marked in evidence as Exhibit 297 (indicating), and you recognize that as a Ford Company drawing. A. I do.

Q. Now, are you familiar with the engineering information cards of the Ford Company? I show you engineering information cards for the A-6250 finish drawings, which are in evidence as Exhibit 292 (handing document to witness), and at the same time I would like to call your attention to the note, engineering information No. 1077, of July 6, 1927, "Two intermediate bearings added," and then the further one on 9/28/29, "Remove second and fourth bearings."

Now, the Exhibit 2 attached to Exhibit A in this matter, if you look at that print that is also a print of the A-6250 shaft, and if you look at that print very closely you can see the outline of the intermediate bearings referred to in the engineering information; is that correct (indicating)? A. Yes, sir.

Q. Now, Mr. Weyl's drawings, or, rather, the drawing which Mr. Weyl produced, he was asked some questions about the matter of removing a quarter of an inch from the end bearings in the manner you had testified about when you were on the stand, and he produced this drawing with the crayon to indicate that construction. I would like to ask you whether or not that would be any departure from the practice you have described as being followed at the Ford Company? A. It would not.

Q. Would you say your records in any way support that? Do you **(2030)** understand what I mean? A. I don't believe I do.

Q. Well, referring to the engineering information, Exhibit 292, the one 1077 shows what? A. Bearings added.

Q. That you did actually add bearings, make a change in the bearings of the model A construction? A. Then we removed them about a year later, and that procedure would be no different than if we had cut the length of the bearings.

* * * * *

(2031) Q. Now, in connection with this proposition of assuming the type of shaft and the design of the shaft as indicated by the crayon in Exhibit 297, would you please tell the Court whether or not that would in any way modify or affect—increase the cost of production to use the intermediate bearings as shown there? A. No, it would not increase the production cost.

Q. As a matter of fact, the Ford Motor Company actually did use that type of construction for well over a year? A. For about a year.

Q. Just on that point, so there can be no misinterpretation, does the mere inclusion of this note on the engineering information indicate or prove that these bearings actually were added and were actually used in the Ford production? A. The record states exactly what happened.

(2032) Q. And, will you state whether or not that was merely experimental? A. No, I don't believe it was.

Q. The fact that the note above shows the part was released for production, would that in any way influence the matter as to whether or not it was an experimental proposition? A. No, sir.

Q. Once the part is released for production, then the engineering information shows it was released for production, then every change noted on the card shows that change was made as a production matter, does it not? A. Yes, sir.

Q. Unless somewhere along the cards you find that the— A. (Interrupting): It might have been just an engineering—that is, an engineering specification like here is one made on 11/17/27, No. 4930, it says, "Drawing retraced."

Q. Yes? A. A record of that kind would not affect in any way the production. That is just an engineering change; purely engineering.

Q. Now, you can tell—what I was going to continue on with—that these engineering information cards indicate the time when production ceased and the part is changed to repair, does it not? A. Yes, that should show.

Q. I call your attention to— A. (Interrupting): No, this record does not show the method we use when a part goes out of use, and we hold it for repairs. (2033) Usually an "R" is added to the first letter. It would show on the record, "A. R."

Q. Yes. It should be on there, but it isn't? A. It is not on there.

Q. Well, you know as a matter of personal knowledge that throughout those years Model A was actually in production? A. Yes, sir.

Q. That, if a change of that type is shown in the engineering information, that it continued as a part of regular

production from this date in the summer of 1927 until, I think it was removed in the latter part of 1928? A. The record shows exactly what happened in that period.

Q. I was asked by counsel for the plaintiff last night to inquire of you this morning how long the Ford Company has used conveyors in the camshaft department; that is, not only the present cam shaft department, in the River Rouge plant, but also whether the conveyors were used at Highland Park. A. Well, they used conveyors in the cam shaft department in Highland Park. I can't tell you what date that is.

Q. Does it go back of 1924, would you say? A. Well, that is about the time—it was right shortly after that, I believe, they moved to the Rouge plant.

Q. Well, you are correct in your recollection. The records here show the cam shaft department, at least these machines, were moved in November, 1924, from the Highland Park to the Rouge. Do you know of your own knowledge when the cam shaft department was moved to the Rouge that the conveyor equipment was put in there? **(2034)** A. There were conveyors being used.

Q. And also had been in use in Highland Park? A. Yes, sir.

* * * * *

(2035) Q. (By Mr. Farley): I think there was some confusion, Mr. Pioch, in connection with this model A. I think at one point in your cross examination you and counsel were talking at cross-purposes concerning the moving of the attachment on the front of the machine outwardly at the end of the operation. A. You are referring to the shaper?

Q. Yes. A. Yes.

Q. For loading purposes. And, there was some testimony as to whether or not that would add to the over-all machine time of the job.

Mr. Spohn: Your Honor please, we have the witness' testimony on that question.

The Master: I don't see why we should go into that again. It was quite thoroughly covered at the time, I think.

Mr. Farley: Well, I was just wondering whether the impression was gained by your Honor because of

that outward movement at the end of the operation of the machine there would **(2036)** be an increase in the cycle.

The Master: Well, go ahead and ask the question and clear it up.

A. I believe I testified it might add a second onto the operation. That is, the added attachment would move out at the same time that the upper head would move up. I said it might take a second more; I wasn't sure.

Q. (By Mr. Farley, continuing): I wish you would explain to the Court how the original shaper worked after the cam shaft was completed. I mean by that, were the tools— A. (Interrupting): The tools that—after they finished their operation, were on a head, and that head, after the tools stopped, would move up.

Q. That is, were raised— A. (Interrupting): Oh, I would say as far as I can remember, maybe 2½ or 3 inches.

Q. And— A. And, the added attachment would have to move at the same time about the same distance to get the work piece out.

Q. And, it would move in synchronism with the other —that is, in the original shaper there was a time interval of probably a second, or whatever it might be—I guess it would be less than a second for those tools to move up? A. Correct.

Q. To clear for unloading purposes? A. That is right.

Q. And your attachment, you would contemplate having the attachment moved outwardly for loading purposes during the same time interval that the other tools were going up? **(2037)** A. That is correct.

Mr. Farley: That is all. You may cross examine.

Re-Cross Examination by Mr. Michael.

Q. Mr. Pioch, was the raising of the tools in the old shaper performed by hand, or was it automatic? A. No, sir, not when the machine was in operation. It was automatic.

Q. It was automatic? A. Yes, sir.

Q. And, to pull the two front tools on this attachment you speak of out simultaneously with the raising of the

upper tools would involve some kind of mechanism so that they both operated at the same time? A. That is correct.

Q. Does the engineering information card show why these bearings were added that you have been speaking of— A. (Interrupting): I don't believe it does.

Q. (Continuing): —the shaft A? A. (Examining document): No, it does not.

Q. Do you know why they were added? A. I do not.

Q. Does it show the longitudinal extent of each of the added bearings on the engineering information card? A. Yes, sir.

Q. Here is the other drawing Mr. Farley showed you, Exhibit 2 attached to Exhibit A, in which you said you could note the **(2038)** bearings sketched in. This is also a drawing in the case? A. Yes, sir.

Q. Do you see the bearings sketched in on this shaft? A. I can see this one very faintly. This line right around in here (indicating).

Q. Do you see the other? A. On the other one, well, you can see part of it.

Q. They are of much greater longitudinal extent, each of them, in this Exhibit A than as shown in red on this Exhibit 292, aren't they? A. Yes, sir. I would say they are about three-eighths of an inch longer.

Q. Would you say that the bearings shown in red on Exhibit 292 were of sufficient longitudinal extent? A. I believe so.

Q. But, when you actually added them they were— A. (Interrupting): I say I believe they are shown in there long enough, because to prove that we entirely removed those bearings later on.

Q. But, when you added them they were considerably of greater longitudinal extent? A. That is right.

Q. Than the one shown in red on Exhibit 292? A. But, the company found out they were superfluous and took them off entirely.

Q. You have no idea why they were put on? A. I have not.

Q. You wouldn't be able to venture even an opinion on it? A. No, sir.

(2039) Q. When they put them on did they shorten up either of the center bearings or the two end bearings? A. I couldn't say.

Q. Could you tell from the card? A. From the record it would show.

Q. I wish you would look to see. A. I will have to read through it. (Examining card.) The record does not show any changes made on the length of the bearing from the time they were added until the time they were removed.

Q. You mean the information cards? A. Yes, sir, Exhibit 292.

Q. Then, I have been referring to the wrong exhibit designation. That should be Exhibit 297 instead of Exhibit 292. A. (Examining documents): Here is a change on the length of the front bearing dated 2/6/29, information number 11934, telling that they changed length of front bearing from 1-25/32 to 1-13/16; that is the only change referred to changing the length. In other words, they changed the length to—they lengthened it 1/32 of an inch.

Q. They lengthened the front bearing? A. Yes, sir.

Q. 1/32 of an inch? A. Yes, sir.

Q. Did they ever depart from that after that change was made? A. I can tell you by reading the rest of the record (examining document). It was not changed again.

Q. Then, when these additional bearings were added intermediate the center bearing and end bearings, there was no shortening of **(2040)** either of the end bearings or the center bearings? A. No, sir.

Q. On the contrary, the front end bearing was lengthened? A. 1/32 of an inch.

Q. And when these intermediate bearings were added, they would have provided just that much additional bearing surface for that shaft, isn't that true? A. That is what the added bearings would do; yes, sir.

Q. Now, I think you said the addition of the bearings would add nothing to the production cost, is that true? A. That is right.

Q. What do you base that on? Wouldn't it require some machining operations? A. No, sir; no extra operations, just extra tools.

Q. Well, extra tools. You would have at least the expense of the extra tools? A. Extra tools, that is right.

Q. And the extra grinding wheels, or the extra wheel on the grind wheels? A. There is no grinding on this operation.

Q. Wouldn't there be a grinding of these bearings that you added? A. Oh, I see, yes; the finish operation.

Q. And, wouldn't it necessitate including bushings or bearing numbers in the motor block? A. Not necessarily.

Q. What would these additional bearings ride in when the shaft was mounted in the motor? A. You mean whether the motor had bearings in there or not, I **(2041)** couldn't say. I know at one time I believe they ran the cam shaft bearing in just the plain cast-iron bearings. Whether this model A had bushings in there, I don't remember.

Q. Well, it wouldn't be very good engineering practice not to rotate these additional bearings in bushings, would it? A. Oh, that would be all right.

Q. Well, assuming you had no bushings, then you would at least have to have—what would you call the members you would have to cast into the motor block in order to contact these bearings?

Mr. Farley: Bosses.

A. Bosses.

Q. (By Mr. Michael, continuing): You would have to do that? A. That is all on the one cast.

Q. You would have to change your patterns? A. Oh, yes; sure.

Q. To get it in there? A. Sure.

Q. And the openings in the bushings would have to be machined in some way? A. Yes, the bore; you would have to have two extra tools in the boring bar. But, I was thinking of the machining time. It would take no more machining time, that is production time. You would still get the same number of pieces per hour.

Q. With whatever tools were necessary to add to take care of the additional bearings? A. That is correct.

Q. And, if you had bushings in the bosses you would have the job of making the bushings? **(2042)** A. If we would have had, that is correct.

Q. Do you think you would have? A. I don't know.

Q. Do you know why the bearings were later taken off? A. I couldn't say.

Q. When the bearings were taken off—I mean the added intermediate bearings—was there any change in the dimensions of the center bearings and end bearings? A. The record doesn't show it; just only the one which we re-

ferred to about the length being lengthened on the front bearing 1/32 of an inch.

Q. Now, the mere addition of the intermediate bearings would not have enabled you to machine the cams on the model A shaft in the Ford shaper as used by the Ford Company, would it? A. Not as used, but, we would have been able to machine it in the shaper with the length shown in red on Exhibit 297.

Q. How would you have avoided the interference with the center bearing and the end bearings? I am speaking now of the shaper as actually used by the Ford Company. A. We couldn't have machined it as actually used, no.

Q. Then, the addition of these bearings, then— A. (Interrupting): That would have involved a change in the shaper.

* * * * *

(2044) Re-Direct Examination by Mr. Farley.

Q. Recalling your testimony when you were on the stand before, as I recall it, you stated that if you wanted to use the shaper without any change, without putting this front slide attachment on on the model A shaft, you could have merely cut one-quarter of an inch off two of the bearings? A. That is correct.

Q. And, you computed an increase in the diameter to give you the **(2045)** same bearing area? A. That is correct.

Q. That was the purpose of your computation? A. Yes, sir.

Q. Now, if you had cut the quarter of an inch off, knowing the use of these intermediate bearings, instead of increasing the diameter you could have supplanted or kept your same bearing surface by the use of the intermediate bearings? A. That is correct.

Q. Assuming you used the intermediate bearings as shown in this print which indicates just an increase of bearing area substantially equal to the amount cut off the other bearings, will you state whether there would still be sufficient room— A. (Interrupting): With the end of the bearings shown in red in Exhibit 297, we would have been able to use the shaper because they are so shortened that

the tools would be able to get down in there without increasing the bearing diameter.

Q. Do you know whether or not you are using on this question of bushing—do you know whether or not you are using any bushings on the cam shaft of the present jobs? A. We do.

Q. On the cam shaft? A. On the cam shaft? No, we press the bushings in the block; in the 8-cylinder engine, V-8.

Q. How long have you been using the bushings on the job, do you know? A. On the V-8 since they started it.

Q. Since they started it? **(2046)** A. I am not sure about the four-cylinder engine. I believe they ran in cast-iron.

* * * * *

(2048) Re-Direct Examination by Mr. Farley.

Q. During the brief recess, Mr. Pioch, have you consulted any Ford Company records to refresh your recollection concerning the matters as to whether or not any bushings were used in the engine block of the model A for the crank shaft bearings to rotate in? A. Well, referring to the Ford Motor Company parts price list for model A and AA in their list of parts it does not show any cam shaft bearing, which I stated before I wasn't sure whether they used one or not. But, the record here shows they did not use a cam shaft bearing.

Q. And, does that refresh your recollection on the matter—I mean, does that now jibe with your own recollection, after refreshing your recollection by looking at the parts price list? A. It does.

Q. As a matter of fact, you just told me you were pretty sure they didn't use it when you were on the stand before, but now that you have checked you see there is none, and you have referred to page 15, which shows the engine? A. Engine and engine assembly, and page 16 which shows the cam **(2049)** shaft and crank shaft parts, and page 17 which shows crank shaft and cam shaft parts.

Q. And all of the parts, if there were a bushing used, it would be shown in the section of disconnected parts at the top of page 17, or would appear in the engine block, is that right? A. That is correct.

Q. And would be noted with a part number? A. That is correct.

Mr. Farley: Well, I will offer in evidence the parts price list, pages 15, 16 and 17.

(The document above-referred to was thereupon marked Defendant's Exhibit 304 by the reporter.)

Q. One other question on this matter of extra tools that Mr. Michael was questioning you about that would be used. What would you say the added cost of those would be, say, per year, as a result of the use of the intermediate bearings? A. Oh, say, $250.

Mr. Farley: That is all.

The Master: What about the finish grinding operation, doesn't the grinder just grind one bearing and—

A. (Interrupting): Yes.

The Master: So, that would take some extra time?

A. It would add on the grinding time; yes, sir.

(2050) Re-Cross Examination by Mr. Michael.

Q. Mr. Pioch, I notice the date of those parts price list is February 1, 1931. The bearings were added in 1927? A. Let me see that.

Q. Would that change your testimony at all? A. I don't believe so. I believe I can clear up. The record shows 1927, and the complete record does not show of any separate bearings being on there, and the fact that this parts price list is 1931, if they had had trouble with bearings, this price list being of a later date, would certainly show they had to put bearings in there.

Mr. Farley: Just refer to the pages which you are discussing.

A. Do you see what I mean?

Mr. Michael: Not exactly, no.

Mr. Farley: Does the parts price list show dates with the various models on them?

A. If our engineering information, Exhibit 292—we are talking of the date 7/6/27.

Mr. Michael: When the bearings were added.

A. Yes.

(Continuing): —is much earlier than the parts price list, 1932. Had they added a separate bearing, this parts price list would show it on here, because it is of a later date.

Q. (By Mr. Michael, continuing): Does the parts price list show the cam shaft with the two added bearings? A. It does. Wait a minute, though—yes, it does.

Q. You are referring to the cut in the upper left-hand corner of **(2051)** page 17? A. That is correct. Marked A-6250-A.

Q. And, that cut you say, does show the bearings intermediate the center bearing and the end bearings? A. That is correct.

Q. Now, if you actually used bushings, and they were pressed in the cast bosses of the engine block, would they be listed? A. Yes, they would be listed in here. So, they did not use a separate pressed-in bushing. You see here, isn't that the engine assembly list (indicating)? Here is your crank shaft and cam shaft.

Q. Different bushings for the end bearings in the model A cam shaft? A. The record doesn't show it.

Q. They also rode just in the cast-iron bosses? A. Yes, sir; in the cast-iron bosses.

Q. And the center bearing also? A. Yes, sir, all the bearings.

Q. Now, I notice on this information card, No. 1 of Exhibit 292, relating to the A shaft, under the same date that you added the intermediate bearings, you also enlarged the end bearing, the rear end bearing, isn't that true? A. The record says: "Rear bearing enlarged from .872-.873 to 1.559-1.560 diameter."

Q. And, with no reduction in the longitudinal extent in the bearing? A. That is right.

Q. Then, under date of 9/28/28, the second and forth, or the intermediate bearings, were removed? **(2052)** A. That is correct.

Q. And, just a few months later, under date of 2/6/29, you increased the length of the front bearing? A. Yes, sir.

Q. So that after the intermediate bearings, the second and fourth bearings were removed, you were using a cam shaft model A which had front and rear bearings enlarged, one lengthened and the other enlarged without a change in length, as compared with the shaft as you used it before you added the intermediate bearings? A. That is correct.

Mr. Michael: That is all.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. That also brings out another very interesting matter that I hadn't noticed before. On the engineering information card 1077, apparently the dimension of the rear bearing of the model A, originally .872 to .873, that is 7/8 of an inch, is it not? A. That is correct.

Q. So that, when you first started your model A production, considering that your rear bearing was 7/8 of an inch in diameter, see, that meant that this was only 7/8 of an inch (indicating)? A. That is correct.

Q. How does that compare with the bearing on the model T shaft in the size of the cams? **(2053)** A. I believe the model T was very nearly that diameter; that is, about 7/8.

Q. In other words, on the first part of the production of the model A this was only 7/8 of an inch diameter, and, therefore, would be less than the diameter of the cams, and wouldn't make any interference as far as that bearing is concerned? A. It appears so.

Q. In the shaper tool? A. It appears so.

Mr. Farley: That is all.

RE-CROSS EXAMINATION by Mr. Michael.

Q. Is that your recollection now, Mr. Pioch? A. I am only taking it off from the record, Mr. Michael.

Q. You have no independent recollection? A. No, sir.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. On that point the record sort of speaks for itself, but in view of the questioning of Mr. Michael, I call your attention to the fact that this parts price list of the Ford Motor Company will list the parts and the years for which the part is in use, for example, A-6250-A cam shaft, in the

third column on the page it gives 1928-31? A. That means from 1928 to 1931.

Q. Yes. So the record, even though printed in 1931, covers all A parts in construction back to 1928 when the model A started? **(2054)** A. That is correct.

Q. And, the record shows that on its face? A. Yes, sir.

RE-CROSS EXAMINATION by Mr. Michael.

Q. Mr. Pioch, the rear bearing on the A shaft, regardless of what it was or may have been, could have offered no interference with the shaper operation? A. I don't believe so; no.

Mr. Michael: That is all.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. Suppose you turn the shaft end for end? Do you see what I mean? The question has been raised, and it is the position that because of the size of the bearings and the spacing of the bearings they couldn't, the shafts could not be machined in the cam shaft shaper without modification. Now, if the shaft, considering the shaft as originally constructed, but with the shaft traveling under the shaper tool as it did, you know, if you put the same end of the shaft in the shaper as was used in model T, then the two bearings which would form an obstruction would be the front bearing and the center bearing? A. That is correct.

Q. Now, if one wanted to use the shaper, and they still employed the small rear bearing as shown in the engineering information card, Exhibit 292, would it have been a very difficult mechanical **(2055)** expedient to take and turn the shaft around end for end, and have it in this way, and then cut off a little piece of the center bearing? Do you see what I mean? A. No. We would have to change the machine to take care of that modification. There wouldn't have been any difficulty about that.

Q. That would simply mean fixing your collets in accordance with the end for end movement of the shaft? A. That is right.

Mr. Farley: That is all.

Re-Cross Examination by Mr. Michael.

Q. It would really amount to reversing the head and tail stock of the machine? A. Yes, we would have had to take the chuck that drives the shaft, and turned it—taken that chuck and put it from the left-hand side to the right-hand side.

Mr. Farley: That would be a tremendously difficult undertaking, wouldn't it?

A. I don't believe so.

Q. (By Mr. Michael): You never undertook to do it, did you? A. No, we never did.

Q. And, you would still have the interference with the center bearing? A. Yes, sir.

* * * * *

(2056) Mr. Farley: I will offer these Exhibits 303 and 304 in evidence.

The Master: I will admit Defendant's Exhibits 303 and 304 in evidence.

Mr. Farley: Mr. Woehrle, will you resume the stand.

Harold M. Woehrle thereupon resumed the stand as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified as follows:

Re-Direct Examination (Continued) by Mr. Farley.

Q. I think you had still another computation which you hadn't completed before you left the stand last night, a discussion which you hadn't completed, is that right, Mr. Woehrle? A. It hadn't been typed last night (producing document).

Mr. Farley: Well, I will offer the computation produced by the witness as Exhibit 305.

(The document above-referred to was thereupon marked Defendant's Exhibit 305 by the reporter.)

The Master: You better have him explain it first.

Q. Will you explain this computation, Exhibit 305?
(2057) A. Exhibit 305 is a computation of the direct

labor cost on the Melling cam lathe as compared with the direct labor cost on the Ford cam shapers when machining the F-446 cam shaft.

It covers a period from June 16, 1925, to March 31, 1928, the accounting period, during which the F-446 shafts were machined in this country. After March, 1928, they were machined in Cork, Ireland.

Now, the summary of direct labor cost shows that the direct labor on the Melling cam lathes was $12,925.31. And, the direct labor cost on the Ford cam shapers was $7,259.33; the difference being a loss amounting to $5,-665.98.

I might explain the method used in this computation. The basis for the turning operation on the Melling cam lathe is Defendant's Exhibit 215, which is the operation sheet prepared by the English branch of the Ford Motor Company, or English company; and, that operation is No. 13. It is to turn 8 cams 2.1016 minutes. Added to that turning operation is a straightening operation, No. 9, which is 1.15 minutes. The two together equal 3.2516 minutes per man, and that amount is used on page 2 of this schedule at the top of column—the third column from the right.

Hours required for two operations on the Melling cam lathe, that is production multiplied by 3.2516 minutes or by .05419 hours. Now, the amount of the turning time for the Ford cam shaper is determined from Defendant's Exhibit 295, which you recall is Mr. Pioch's computation of the cycle of the shaper, comparing the cycle of the F shaft with the cycle of the T shaft. The cycle of the T shaft was 25.3 seconds, while one cycle on the F-446 shaft was 38.5 seconds.

(2058) Now, applying that proportionate increase in time to the known time for shaping model T shafts, which is 1.20, you arrive at a result of 1.8261 minutes per man, and that amount is carried forward to the schedule, page 2 of column 3, where it is stated that the Ford cam shapers, hours required for two operations, production multiplied by 1.8261 minutes, or by .030435 hours. I might say at this point that the comparison of the weights, or the comparison made by Mr. Rauser's experience in the handling time of the F shaft, compared with the T shaft shows that the handling time and the machining time varied in approximately the same proportions.

I have those percentages figured, and I think I better give them to you.

The increased machining time, that is the increase of the F-446 machining time over the T-410 machining time is approximately 56 per cent. Whereas, the handling time is approximately 52 per cent. That is comparing the larger F shaft with the smaller T shaft.

Q. I understand by that you mean that the increase in the handling time, taken at the ratio that you have used at your computation, Exhibit 305, is the one that is 56 per cent, is that right? A. I have used approximately the 56 per cent increase; that is for machine time and handling time. Whereas, Mr. Rauser's computation shows that handling time would have increased approximately 52 per cent. The difference is immaterial.

The Master: I wonder if there might not also be an increase in handling time because of the fact there would be **(2059)** only one or two machines used on the tractor cam shaft, and there wouldn't be as much opportunity for supervision and observation on that one machine as where you have a battery of 10 or 12 machines. It seems to me there would be more likely to be an inefficiency of the handling of the tractor cam shaft than the model T cam shaft for that reason.

A. In other words, you think because you haven't got another man alongside of him to compare his production, he might lag, is that the idea?

The Master: Yes. And if you put, or if the man was doing the job quits, or is fired, and you have to put a new man on, you will have to educate him pretty much from scratch; whereas, if you have a battery of machines, you will have enough men, or at least a new man won't affect the production on 10 or 12 machines to anything like it would on one. Isn't it your experience as an accountant, that where you have a large amount of production, you have a consequent more efficiency in operations other than operations of the machines themselves?

A. Well, I think there is a place where you can get less efficiency by more operators. In other words, it might get out of hand. I think there is a happy medium there

some place. I don't believe you can say definitely one way or another. I think there is a human element there, and also the supervision that is there. If you have a pretty tough supervisor or straw boss, I think you are going to get the same results out of the machines, or the men, regardless of the number.

The Master: If you take a blacksmith, for example, in a blacksmith shop where there isn't any specialization, and **(2060)** he is turning his attention to all different kinds of tasks during the day, he is going to make a lot of waste movements of his hand as compared with both his hands and his feet, and there is going to be a great deal of waste motion as compared with—

Mr. Farley (Interposing): A fellow on one of the production lines in the Ford Motor Company.

The Master: Yes. If you go to that extreme.

A. Specialization does increase efficiency; there is no doubt of that.

Q. (By Mr. Farley): In any event, Mr. Woehrle, so far as that production factor—that is, high production versus low production is concerned, it would apply equally to the same production whether that production was production on the shaper or production on the Walcott machines, don't you think so? A. I think so. In other words, you are going to have two machines—

The Master: That would probably be true, but it is probably taken into consideration in the Walcott machine because there you have a direct time study that was made which would reveal those lost motions; or, at least, those lost motions, or lack of efficiency, that you might have with the higher production, is directly accounted for; whereas, where you are taking a shaper operation on a cam shaft, which is in high production, and making a direct proportionate translation to the shaper operation and cam shaft, only a few of which are being produced, you don't take that into consideration.

(2061) A. Yes, sir, your Honor, if we would make a computation based on just a proportionate method. In other words, take a T shaft turned on the Walcotts, and

F shaft, and compare the relative increase in time, I think you will arrive at the same difference we have here. Add that on the T shaft, you remember, and it proves out practically the same. I don't believe I have got a computation on the F shaft just on that point.

Q. (By Mr. Farley, continuing): Where is that computation on the T shaft that you have reference to? Is it in any of those exhibits? A. No. I testified yesterday that I had—yes, in Exhibit C there is a similar computation; before we changed to C'.

Q. You made reference to that just for the purpose of the record? A. Of course, we have changed several other factors since C was prepared, so that the comparison isn't in line with the facts now. But, the method is the same.

On page 24 of Exhibit C, the paragraph about in the middle of the page reads as follows:

> "The time of 1.67 minutes for shaping cams on Ford cam shapers compared with 1.20 minutes, for turning cams on Melling cam lathes was determined by applying to the known 1.20 minutes for Melling cam lathes the same proportionate difference that prevailed in the T-410 comparison. That is, .86 minutes for turning T-410 cam shafts on Melling cam lathes compared with 1.20 minutes for shaping T-410 cam shafts on Ford cam shapers."

Now, that comparison method, you recall, we have in C', the perimeter method using Mr. Pioch's figures, and we get **(2062)** 1.3755 minutes for shaping the A shafts in place of that 1.67 minutes on page 24 of Exhibit C.

Now, in place of the 1.20 minutes for shaping T-410 cam shafts—pardon me, I mean the known 1.20 minutes for Melling cam lathes, that would be 25 an hour we use in our Exhibit C here—I have since changed that to 30 shafts an hour, which would be 1 minute even.

Now, if we apply the proportionate increase to the one minute we get for the shaping operation on the model A shaft 1.40 minutes instead of the amount that I have used in C' of 1.3755. It is an immaterial difference, you see. That is the method used in comparing the model T and the A shaft.

Now, we could use the same method in comparing the model T with the model A on the Melling, and then compare that to the shaper and get about the same results.

Q. Let me ask you this, Mr. Woehrle, as I find it here on page 17, whether this present new computation or, rather, more detailed computation, Exhibit 305, relates solely to the F-446 shafts, and in that connection whether the Ford cam shapers was the standard of comparison? A. That is right.

Q. Does this new Exhibit 305 change the result particularly, or is it just simply a more detailed computation? A. It is a more detailed computation. It is just a separate computation to give another method of computing the F-446 shaft in addition to the one I have already presented in Exhibit C', page 17.

(2063) Q. You have already on this Exhibit C', page 17, made a computation and a comparison, or rather, a computation based on the use of the Westinghouse machines as a standard of comparison for the F-446 shaft, too, have you not? A. Yes, a comparative method; yes. Now, is it clear to everyone how we figure on page 2? I think the system is the same as we have always followed in our previous schedules.

Q. Yes. Page 2 is quite readily understandable, it seems to me, in view of the other explanations you have given of your other computations. This page will give, of course, the comparison on the month to month basis throughout the entire infringing period? A. That is right. I might state that had we had sufficient time, we might have worked up some direct labor rates for the department in which the F-446 shaft was actually machined. However, we have used the direct labor rate for the department 410 following the same practice which Mr. Moise did in his Exhibit Z and Z'.

Q. And this, of course, you have not included this burden figure in Exhibit 305 at all? A. No, there is no burden in Exhibit 305.

Q. Well, naturally, any change in the productive labor rate wouldn't change the comparison in so far as profit or loss is concerned? A. No, because you use the same direct labor rate for each machine, both the Ford cam shapers and the Melling cam lathes; month to month the rate is the same.

Mr. Farley: I think that is all. You may cross examine.

* * * * *

(2064) Re-Cross Examination by Mr. Spohn.

* * * * *

(2076) Q. I understood you to say, referring to burden, that you called up Mr. Hovis, I think you said the night before last, which would be Thursday night. Is that when you called Mr. Hovis? A. I called him 8:30 Friday morning.

Q. You called him 8:30 Friday morning? A. Yes.

Q. And he gave you this list of 30 or 31 accounts? A. Yes.

Q. Is that the first time you talked to Mr. Hovis on burden? A. Just directly on that angle, yes; that is right.

Q. What you wanted there was a list of account numbers going in to make up their burden figures? A. That is right.

Q. And, as I understand, they gave you their current list, did they not? A. That apparently is their current list, because it has Social Security tax on.

Q. And, you don't know anything about any prior lists being in (2077) existence? A. Well, I think we can get a list for almost any date you need.

Q. You haven't any breakdown by amounts, do you? The testimony is here there is no breakdown. A. I am not so sure of that. I think it possibly could be broken down by amounts. I am not positive of that.

Q. Mr. Hovis said it couldn't be. You have never seen any breakdown, have you? A. No. Give me time and I might get one, though.

Q. Do you know whether there is any breakdown by classification of departments for those years? A. No, I actually don't know the facts on that.

Q. Now, turning to Exhibit C, I understand that pages 1 to 7 are to remain unchanged, is that right? A. That is right.

Q. And the speed of the shapers in your computation there is 25 an hour, that is right, isn't it? A. The speed of the shaper is 25 an hour on the model T; that is right.

Q. And the Melling speed is 35 an hour on sheet 1, schedule 1 of Exhibit C, that is right, too, isn't it? A. 35 an hour, that is right.

Q. Now, if the Master finds that the Melling machine turned the T shafts at a speed which differs from your 35 an hour, your account on sheet 2 of Exhibit C can be changed by proper mathematical computation to reflect the Master's findings, can't it? A. Well, the correct way would be to figure it month by month just as I have it.

(2078) Q. But, it could be done? A. Oh, yes; sure.

Q. Now, on sheet 1 of your report, Exhibit C, there is a straightening cost there chargeable to the Melling production on the T shafts? A. Yes.

Q. Now, if the Master finds no straightening operation, straightening cost that is properly chargeable to the Melling in the turning of the T shafts, here again your account on your Exhibit C, sheet 1, can be changed by mathematical computation to reflect that finding, can it not? A. Yes, the same way. In other words, change it to the number of operations it takes to turn the shaft, omitting the straightening operation.

Q. Now, do you have sheet 1 of schedule 1 of Exhibit C before you? A. I have.

Q. You have depreciation there charged to shapers of $19,248.69? A. That is right.

Q. How many shapers did that cover? A. 13.

Q. 13? A. That is right.

Q. The defendant had 22 in operation in 1924, did it not? A. No. Wait a minute, they bought some more in 1922. That is right.

Q. They bought some more when? A. In 1922.

Q. It is a fact, isn't it, they had 22 shaper machines in operation in 1924? A. I don't believe so. Just a minute. (Examining records.)

(2079) Q. I beg your pardon, Mr. Woehrle, that was 17 in 1924. Take a look at paragraph 27 of Defendant's further statement of account, Exhibit B. A. What paragraph is that, Mr. Spohn?

Q. Paragraph 27. It is on page C of Defendant's Exhibit B. A. (Examining document): Is there a question on the record?

Q. That shows, does it not, that the defendant had 17 shapers in use in 1924? A. That is right.

Q. And, the record further shows that in 1924 an order for 5 more of those shapers was cancelled? A. I believe that is in the testimony.

Q. You only used 13? A. I used the 13 machines that were in use for the period up to January, 1924. In other words, there were 13 in use up to that point. The other four were acquired in January and February of 1924, just a month or two prior to the purchase of the Melling machines. Now, those shapers were used a very, very short time, maybe a month or two.

Q. One of them was used for 4 months here, as the record shows, used until June, 1924.

Mr. Farley: I would like to ask Mr. Spohn where the record shows the use of that? As I understand Mr. Herklotz' testimony, those shapers never were used.

Mr. Spohn: I am just reading from your answer to this 27, date of last use, June 5, 1924. I don't know whether it is right or not. That is what I am referring to.

Mr. Farley: I see. I thought you were talking about the wrong one.

(2080) A. I don't think there is any record that says they were actually used. They may have been in the department. This record we got these from is a permanent inventory record which shows they were in the department.

Q. Referring back again to schedule 1, sheet 1, of Exhibit C, you have some maintenance repairs items there chargeable both to the Melling and the shaper operations on the T shafts? A. That is right.

Q. If the Master finds these maintenance repairs as charged by you in your report both against the shaper and Melling machine, or either of them, are not properly chargeable, a correction can be made by proper mathematical computation to reflect that finding? A. I think you would have to refer to my work papers on this, because you would have to have the number of shafts and hours to make that computation.

Q. But, it can be computed? A. Oh, yes.

Q. And, the same is true with respect to the item of

extraordinary repairs set forth on schedule 1, sheet 1 of Exhibit C, if the Master finds those extraordinary repairs are not properly chargeable to the Melling operations on the T's, that can be adjusted in your report by a mathematical computation? A. That is right.

Q. And, likewise, if the Master finds your account should give some effect to the savings and advantages by reason of overhead or burden, your report can be adjusted to reflect that finding? A. I believe I figure all of the overhead or burden in this **(2081)** computation, at least the direct burden expenses with the exception of, perhaps, tool cost, and I think that has been explained away by prior testimony.

Q. And, if the Master finds other adjustments must be made with respect to burden, they can be reflected in your account by mathematical computation? A. Yes, I believe so.

Q. Do you have before you Exhibit C'? A. Yes, I have a copy.

Q. On sheet 8 of Exhibit C', you have debit cost on Ford cam shapers? A. All right.

Q. Does that indicate the Ford cam shaper is a standard of comparison for machining the A-6250 cam shafts? A. It is.

Q. What kind of a Ford cam shaper have you used in here as a standard of comparison? A. Oh, it could be any number of shapers which would not add any material cost to the shaper operation.

Q. Well, which one did you have in mind when you built up this cost? Which one did you have in mind? A. I had the one in mind Mr. Pioch told me about.

Q. Is that Exhibit—the model now designated as Exhibit 256? A. I don't know what Mr. Pioch had in mind when he told me he would design the shaper.

Q. Anyway, you had in mind a shaper which was to be designed by Mr. Pioch? A. That is right.

Q. Is that what you had in mind as a standard of comparison in **(2082)** building up this sheet 1, schedule 2, page 8, Exhibit C'? A. I don't think so. We also had the idea, or, it was given to me by various conferences I had with men in the shop that, perhaps, the shaft would be modified.

Q. Is this account, then, sheet 1, schedule 2, page 8, also supposed to cover a shaft modification, too? A. It will

cover any shaping operation that doesn't increase the cost of machining it.

Q. Any shaping operation at all? A. That is right.

Q. What other might it cover, then, besides the modification of the shaft in Exhibit 256? A. Mr. Oberhoffken's method, also.

Q. It covers his method, which was a re-designing of a new machine altogether? A. It covers any one you can use which doesn't increase the cost of the shaping operation.

Q. What else does it cover? A. I believe there were several other methods mentioned, but I don't recall just how they operated now. In other words, Mr. Hunt, I believe, had another theory, but I don't know whether it has been put in the record or not, and Mr. Brush had another one.

Q. Anyway, these figures you have set down here for debit cost on Ford cam shapers, is supposed to cover any of the three methods? A. Any of six methods.

Q. One set will cover any of six methods? A. Assuming no additional cost of the operation will be necessary.

(2083) Q. Then, these figures are based on the assumption there will be no cost change? A. That is right. Any material cost or immaterial cost might affect it slightly.

Q. The material cost would affect it materially, wouldn't it? A. If you can prove a material cost, yes.

Q. And, a slight change would affect it slightly? A. That is right.

Q. Now, Mr. Woehrle, have you got your work sheets there with you? I want a little information here. A. Oh, I have got practically everything here, yes.

Q. What I want to know is, you will notice on page 8, sheet 1, revised schedule 2 of Exhibit C', you have depreciation charged to the Ford cam shapers of $31,728.94? A. That is right.

Q. Have you got the cost that you can detail here upon which that depreciation is computed? A. Yes.

Q. Let me have that, please. Just the machine cost, Mr. Woehrle; I am not interested in the period it was used.

Mr. Farley: Isn't that right in your exhibit somewhere, Mr. Woehrle?

A. No.

Q. (By Mr. Spohn, continuing): Just let me have your brass tag numbers and your costs. A. Brass tag No. 10,706.

Q. All right. Cost? A. $4,503.35.

Q. All right. **(2084)** A. Brass Tag No. 11628.

Q. Cost? A. Cost, $4,463.50.

Q. Next?

A. Brass Tag No. 12205. Cost, $4,473.50.
Brass Tag No. 15300. Cost, $4,424.39.
Brass Tag No. 15303. Cost, $4,413.00.
Brass Tag No. 15353. Cost, $4,755.00.
Brass Tag No. 15435. Cost, $4,766.39.
Brass Tag No. 15436. Cost, $4,775.56.

By the way, these are the shapers. Did you want the Melling first?

Q. No. Go right on.

A. Brass Tag No. 15437. Cost, $ 4,842,99.
Brass Tag No. 19908. Cost, $10,179.39.
Brass Tag No. 20077. Cost, $10,179.39.
Brass Tag No. 28126. Cost, $ 5,915.65.

Now, from there on I have used—I have substituted the shaper for each old shaper that became fully depreciated.

Q. At what cost, Mr. Woehrle? A. At $5900.

Q. Just approximately. A. The cost of the last shaper.

Q. The cost of the last shaper? A. The cost of the last shaper.

Q. Which was $5,895.69? A. I got $5,915.65. I see what you mean; you mean another shaper that was bought at that time.

Q. I have Brass Tag No.—which was the last one, right on down? **(2085)** A. That is right.

Mr. Farley: You use the price of the brass tag 28126.

A. It doesn't make any difference. They are both about the same.

Q. (By Mr. Spohn, continuing): $10? A. Yes, $10 apart, so whenever you have a shaper that became fully depreciated, I added another one at $5,900.00. I might say

there might be some difficulty in this computation. There was one shaper that was rebuilt, if you recall that. No. 8866 was rebuilt, I believe.

Q. That was done before the accounting period, was it not? A. Yes, before the accounting period.

Q. So that in figuring your depreciation on sheet 8—or, page 8, now, of your Exhibit C′, you use the actual cost of the old shapers as you detail it in here? A. That is right, except for each additional shaper.

Q. Which you took at $5900? A. That is right.

Q. Have you any cost for shaper attachment in there? A. No, there are no shaper attachments.

Q. Have you, on page 8 of your Exhibit C′, computed any additional charge to the shaper because of any trouble they might have by reason of the attachment on Exhibit 256, and the movable parts on it? A. No. I assume there would be no additional cost.

Q. Now, as I understand your sheet 8 of Exhibit C′, the speed of the Melling cam lathes is 1 minute or 30 an hour, is that right? A. 30 an hour, that is right.

(2086) Q. And, of course, here again if the Master finds this speed should be something which differs from the speed you computed, your sheet 8 can be corrected by mathematical computation to reflect the Master's finding, can it not? A. I believe so.

Q. And, do I understand there is a straightening operation included in the cost or charge to the operation of the Melling cam lathe on A-6250 shafts? A. That is right.

Q. Sheet 8 of Exhibit C′? A. That is right.

Q. And, if the Master finds there is no straightening cost, that can be corrected in your sheet 8? A. That is right.

Q. Mr. Woehrle, you have your number of Melling machines that were used in computing depreciation, $27,645.49, as set forth on page 8 of Exhibit C′? A. I have.

Q. And the cost? A. Yes.

Q. Let me have those figures with the brass tag numbers. In order to shorten your answer to this, will you take a look at paragraph 2 of Defendant's further statement of account, Exhibit B. Are those the brass tag numbers and the cost set forth in that answer that you used? A. They are in different order so I will have—I believe they must be the same figures. There is no doubt about that.

Q. And the same brass tag numbers as far as you know? A. Just one moment, I will total them up. They would be **(2087)** except for two. There are 24 machines there and I have used 22.

Q. You haven't used the two machines which have been identified as the tractor? A. That is right. We used 16 for a while, and later on 22. For the model T computation, though, we used only 16 Mellings.

Q. You used the total number of 22? A. For Model A?

Q. For Model A. A. No. We still use 16, and then use them as they were acquired in 1929—I think they were acquired in 1929—in other words, we picked them up the dates they were acquired.

Q. And again, with respect to maintenance and repair items, you have the figures, do you not, and if the Master finds maintenance and repairs are not properly chargeable as set forth on sheet 8 of Exhibit C', a mathematical computation can be made to reflect the Master's finding? A. Absolutely. Naturally.

Q. And, the same is true with respect to burden, if the Master finds some effect should be given to advantage of burden, again a proper adjustment can be made mathematically with your sheet 8, Exhibit C', to reflect that? A. That is only assuming he adds more burden items than I have included in my computation.

Q. That is right, or changes? A. Or changes of burden.

* * * * *

(2089) Q. Now, turning to your page 17 of your Exhibit C', if the Master finds the defendant received a profit or advantages in the turning of those A-6250 shafts, and the T shafts on the Melling cam lathes, then the sheet 17 of your Exhibit C' would show a profit in accordance with your method of computing, wouldn't it, by comparison? A. By comparison in this schedule, yes, but remember we also have Exhibit 305 which was introduced this morning in another computation.

Q. I am just referring to sheet 17. A. That is right, if you want to assume this is the same basis.

Q. I will come to that in a minute. A. All right.

Q. Here again that comparison method could be made. It is just a matter of mathematical computation? A. That is right.

Q. Now, referring to Exhibit 305, you computed your direct labor **(2090)** cost on the turning of the F-446 shafts, first on Melling cam lathes and later Ford cam shapers? A. Yes, sir.

Q. What kind of Ford cam shapers did you have in mind or intend this direct labor charge to cover? A. The same type that I explained for the model A.

Q. That is the three you described for the model A? A. Six.

Q. You only specifically mentioned three, did you not? A. All right, three.

Q. And, you have those same three in mind? A. Yes, sir.

Q. And, this one item of labor cost on these Ford cam shapers, as you have it in Exhibit 305, is supposed to cover each of those three types of shapers? A. That is right.

Q. But that cost, Mr. Woehrle, is in each instance the cost of running the old shaper, the old Ford cam shaper, is it not, except as adjusted for speed? A. It has been adjusted for speed, yes, by the method described herein, which is the perimeter method computed by Mr. Pioch; slowing the time down for the operation based upon the perimeter of the F-446 cam shaft.

Q. And that is also true, is it not, with respect to page 8 of Exhibit C', that your cost of the Ford cam shapers, except for the question of speed, is the old cost of the old Ford cam shapers? A. That is right.

(2091) Q. The cost of operating the old Ford cam shapers? A. That is right, the cost of operating the old Ford cam shapers.

Q. And that is also true of the computation set forth on page 13 for the—no—on page 17 here you make your comparative computation? A. That is right. Those same figures are carried back there.

Q. Yes. Mr. Woehrle, what department, if you know, was Mr. Nellis in at the time you talked to him and secured Exhibit 15? A. He is in the purchasing department.

Q. In the purchasing department? A. That is right.

Q. So that that Exhibit 15, then, was in that department at that time? A. Yes. I can even explain why it was in that department.

Q. Do you know— A. (Interrupting): It was in a file marked T-410 with the papers which Continental Motors, correspondence with Continental Motors at the time the T job was let out to Continental Motors in 1929. That was in there. What it was used for, is not evident.

Q. Does Mr. Nellis' department have anything to do with the purchase of machinery of this type? A. No.

Q. Does he buy cam shafts in his purchasing department? A. I think he buys steel parts. I don't know whether—I assume it is cam shafts.

Q. He had the Continental correspondence? A. He had the Continental correspondence.

Q. And it was from the Continental that the defendant bought those **(2092)** cam shafts? A. That is right, that is beginning January 15, 1929.

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RE-DIRECT EXAMINATION by Mr. Farley.

* * * * *

Q. I was just wondering about that proposition of discussing burden with Mr. Hovis. I think you said the first discussion you had with Mr. Hovis concerning this phase of burden, or some expression like that, was when you got this information. Do I understand from that that was the very first time you talked the matter of burden over with Mr. Hovis? **(2093)** A. No. We had discussed burden, but not in connection with this, the burden that went into the percentage.

Q. You talked with Mr. Hovis, in a general way, of what went into burden, but this is the first time you ever got a complete computation? A. That is right.

* * * * *

Q. Now, on the matter of depreciation of the shapers, would you just explain why it was you eliminated the last four shapers from your depreciation cost? **(2094)** A. Well, they were only in the department a very short time, a month, or two, or three, and I wanted a figure that would give me the correct depreciation computation on the battery of machines that were necessary to get out the Ford production.

During the year 1923 we turned out 2 million cam shafts on 13 shapers. In other words, that is all we had available, 13 shapers. We got out 2 million cam shafts. And, that is the most cam shafts we ever got in one year.

The next year, 1924, we dropped slightly below 2 million.

With that information I didn't think it logical to add four more machines which were only used a month or two in the department, and which may have even replaced some of the old machines that had been around the plant for 7 or 8 years. I used 13, at the time when they had their peak load.

Q. Did you make any inquiry as far as the model T production is concerned, particularly for those months where you did not have their actual production figure for department T, as to whether or not in any of that period the Ford Company bought any of those model T shafts from outside? A. I don't know if they bought any outside on the T. I don't think they did, although I haven't positive proof of that.

Mr. Spohn: Have you any proof either way, Mr. Woehrle?

A. I don't have any proof either way. I do have proof that some of these F-446 shafts were bought outside in 1923; 1922 or 1923.

Q. (By Mr. Farley, continuing): I recall very definitely that I had a check made on that, and I thought I had you follow it up, that there had not been model T shafts bought outside. **(2095)** I know I inquired of two or three different sources around purchasing, different fellows, and that is what they told me. A. If you are speaking of 1923 and 1924, I have actual production records for those to support the 2 million cam shafts I mentioned. There is no doubt about those. If we bought some more outside, these would be in addition.

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(2102) DONALD M. RUSSELL was thereupon called as a witness on behalf of the Defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. You live in Detroit, Mr. Russell? A. That is right.

Q. And, what is your occupation, please? A. I am a certified public accountant, resident partner of Lybrand, Ross Brothers and Montgomery, in Detroit.

Q. Lybrand, Ross Bros. & Montgomery, is that what we call a national firm of accountants? Is this the only office they have— A. (Interrupting): No, we have about 23 offices in different cities in this country and in Europe.

(2103) Q. About how long have you been with Lybrand, Ross Bros. & Montgomery?

Mr. Spohn: Your Honor please, Mr. Russell's qualifications are readily admitted.

Q. (By Mr. Farley, continuing): You have done considerable cost accounting work? A. Yes.

Q. And, have you had any, in addition to your accounting work, any training or qualifications with reference to actual shop— A. (Interrupting): I was trained as an engineer. I had two engineering degrees; bachelor of science in 1913, and graduate degree in 1916 as electrical engineer.

Q. And, you have done cost accounting for quite a number of large concerns? A. That is right.

Q. Manufacturing firms? A. Manufacturing establishments.

Q. I note on this list that apparently you did some cost accounting for the Baldwin Locomotive Works? A. Yes, that is right; their subsidiary, South Work Foundry & Machine Company; Cramp Brass & Iron Works.

Q. Well now, in connection with this present matter, Mr. Russell, have you done any particular work on it with Mr. Woehrle? A. Yes, I have. I have been familiar with the development of this thing over the entire course. Our firm has been connected with it since about October, 1937.

Q. In fact, you came with Mr. Woehrle over to my office when your firm was engaged on the matter? **(2104)** A. That is right.

Q. I wonder if you could repeat, as accurately as you can remember, the instructions which I gave at that time when you first came over as to the nature of the work to be done? A. Well, at that time it was explained to us that this matter was for the purpose of determining the amount involved, and any savings that were made by the Ford Motor Company by the use of these machines, and you asked us to take a fresh start and go into the original documents and records to try to determine a computation that would fairly set forth any such savings or losses.

Q. Now, then, Mr. Woehrle started doing—I suppose what you might call the field work on the matter? A. Yes, that is right. He and I after talking with you the first day went out to the main office and had some talks; talked first with Mr. Martindale, and then with a Mr. Hovis and others, and it became apparent it was going to take a good deal of detail digging into the records, and from that time I didn't do that myself; I left that to Mr. Woehrle, but I think he talked over the matter with me probably twice a week while he was actively engaged on the field work.

Q. You heard Mr. Woehrle testify here? A. Yes.

Q. As you know, he has prepared and filed a number, —rather, we have presented them as exhibits, a number of various schedules and computations. I would like to ask whether you personally made any review or check of those computations before they were filed? A. I reviewed them all before they were typed in manuscript form, **(2105)** and in a sense headed them so far as the wordings were concerned; column captions, and so on, and that all had my approval.

Q. Did you consider the correctness of the bases a fair and reasonable basis used by him in making his computations? A. Yes, we discussed all those things.

Q. Having in mind that these comparative costs as set forth in these schedules of account were comparative, they are based on a comparison of two different methods, assuming that the standard of comparison used is a proper legal standard, would you say that these accounts and figures were susceptible of determination or calculation with reasonable certainty? A. It is my opinion that the comparisons are set forth in a substantially accurate man-

ner, and that it is possible to make the computations with reasonable certitude.

Q. Would you say that they are accurate with sufficiently reasonable certitude that you would be willing to place a certification upon them as a certified public accountant? A. I would be willing to certify my opinion as to the general result. I wouldn't want to say that the figures in either case represent total costs of the respective operations, but I do believe that in as much as we were here to determine savings, that they properly show, and that we could certify the general result that there was no profit.

* * * * *

(2106) Q. I would again like to have your statement, Mr. Russell, as to the matter of burden of which, probably, you have heard considerable discussion in the testimony here, as it affects this particular computation or accounting. A. Well, it is my belief that the viewpoint in trying to arrive at savings or losses here is a viewpoint that the management would have, for example, faced with two possible courses of action here; the selection of two alternative machines. If they were faced with that problem they, of course, would not figure that the administrative salaries, Edsel Ford's salary, Mr. Sorensen's, Mr. Martin's, had anything to do with that computation, because the selection of one machine or the other would not change that administrative expense.

In the same way, there are many other items in the overhead computation that would not have been changed in any manner by the selection of one machine over the other.

The Master: I suppose if the management were faced with that problem, all they would be interested in was whether one machine would cost more than the other, and not the amount by which the expense of one machine would exceed the expense of the other.

A. They would be very much interested in the expense and the operating wages, because it isn't only the first cost, but the operating cost.

The Master: I am not speaking of, simply, the cost of purchasing the machine, but the cost of the

machine over a (2107) period of years considering all costs that enter into the situation. They wouldn't care about determining the exact amount of extra cost by using one machine over a period of years over the other one; all they would be interested in determining is which machine would cost the most, and whether it is $1,000 more for one or $10,000,000, they wouldn't be particularly interested. They would be likely to pick the one which cost the least in either case.

A. Well, they would be interested in knowing how much, I think. That is, whether there was to be a great difference or slight difference in the expense of working and using these machines. It is true if they could see that there was $100,000 advantage in favor of one over the other, and the advantage was going to run to $500,000, they would be satisfied if they could prove it was $100,000. But, in making that comparison, for example, of course, you can argue that theroretically the insurance might cost more on one machine than the other, but if from the practical standpoint a company of this kind, possibly, has a blanket policy for 5 million dollars for building and contents, it is very doubtful whether there would be any influence in their insurance expense by the selection of either machine, and you can go through the various items of overhead. I think that the items to be principally considered are those that have been discussed in Mr. Woehrle's testimony.

The Master: You consider practically all the other items of overhead are in the nature of fixed costs not affected by the increase in operating costs of one machine over another?

(2108) A. Exactly.

Q. (By Mr. Farley, continuing): Assuming, Mr. Russell, that the Ford Motor Company had, for any reason whatsoever, wished to reach a determination at the time I called you into this matter as to just what, or just which of these two methods of machining cam shafts was the better method to use. Now, my question goes to the matter of the comparison between these shapers and the Walcott machines, and we are going to be guided in the

purchase of new equipment by whatever findings you would make. Would you go about ascertaining these various costs in any different manner for an opinion of that type than you already have done in this case? A. No, I wouldn't. It seems to me it is the same problem from an accounting viewpoint.

Q. Of course, in view of the fact that was a matter of legal proofs, I naturally assume that you probably went into greater detail here than you would— A. (Interrupting): That is true.

Q. (Continuing): —in the other situations? A. That is true.

* * * * *

(2112) Q. Now, I would like to have your opinion, or statement, as to **(2113)** whether or not in your opinion Mr. Woehrle found sufficient records of the Ford Company to make sufficiently accurate computations such as are contained in his report? A. It seems so to me. Now, the main elements—you can go right through them—on the question of production we found some record for the entire period, actual production about which it seems there can be no question as to a great many months, and engine numbers plus service parts for other months, which it seems to me is a satisfactory basis to proceed on. I think the influence of inventory is practically negligible.

The testimony has shown, and the practice is, that they only keep a bank of 2 or 3 days' supply, and in a two weeks' process production, such as they have at the Ford Company, I think it is substantially accurate to rely on these figures. That is, the parts don't go into stores department and stay there for use at some other time in the year. Their operations all follow the seasonal curve of their sales and shipments, and when shipments stop, the assembly line stops and the sub-assembly line stops. The whole thing is keyed together as a continuous production, and inventories have very little effect.

Then, on the question of labor rates, if you want me to go ahead—

Q. Yes, go ahead. A. On the question of labor rates, we have the average of the particular department that was working on these parts, and while theoretically it would be desirable to have the actual **(2114)** rate of the man that

worked on the machine, I think for practical purposes it is satisfactory to take the average departmental rate. It would certainly have to be used in 999 out of 1,000 computations of this kind.

Then, on your rate of production in the machines, it seems to me that every step of our computation all the way through, as we found it finally, wound up at least goes back to a company record of one kind and another, and they all hang together, and to me tell a reasonable story.

* * * * *

(2115) Q. (By Mr. Farley, continuing): Assuming, Mr. Russell, in these comparisons of costs, any comparison of cost that you have a change in the plant from one type of a machine to another type of machine, and when the second type of machine comes in, because of certain peculiarities of that machine it is then necessary to put in an additional operation, which in some way is to prepare the part for the new machine so that the new machine can function properly. Now, would you, as a cost accountant, employ the cost of the two operations used later as compared with the cost of the one operation used earlier? A. Yes.

Q. Now, coming to the question of a straightening operation which has been involved in Mr. Woehrle's computations, let me ask **(2116)** first, was there any record which Mr. Woehrle submitted to you which, to you as an accountant, would justify the use of the cost of those two operations against the cost of a single operation? A. Well, these records that went in as Exhibits 13 and 14 raised the question right away, because the straightening operation appeared in one and didn't on the other. However, I don't think just on the basis of that I would be justified in going ahead and completing an entire computation, but further investigation proved that the extra operation was related to the Melling machine. Therefore, we did go ahead and use it.

The Master: If you are going to be accurate about making a cost comparison where you have an additional operation on a separate machine required by the use of one machine, whereas you do not have such an extra operation necessary with the use of the other machine, you would not only have to take into consideration the additional labor cost, but also the cost

of the extra machine required; that is, the machine upon which the second operation was performed, would you not?

A. Yes, I think you are right.

Q. (By Mr. Farley, continuing): That is an element of cost you neglected to consider, then; or, you and Mr. Woehrle neglected to consider? A. It appears so; whether it is material or not, I don't know at the moment.

Q. I think we all agreed, having seen these little straightening presses we have out there, it certainly should not be a very material item of cost.

(2117) Mr. Spohn: Especially when the man hit it with his hand and it would straighten, I don't think you could figure the cost of that.

The Witness: It seems to me the only items that would come in there would be, possibly, the depreciation on that press.

Q. (By Mr. Farley, continuing): Now, have you installed any cost accounting system yourself for any large manufacturing establishments, such as Ford Motor Company? A. Not for any as large as the Ford Motor Company; no, sir.

Q. Not any quite that large? A. But I have put in cost systems in several of them.

Q. In several rather large concerns, have you not? A. Yes. I can mention the Hamilton Watch Company, and the Illinois Watch Company, and others.

Q. And, your firm has also done quite some accounting work for the Ford Company from time to time, have you not? A. Yes.

Q. And have you assumed you are fairly familiar with the cost accounting methods of the Ford Company? A. Well, I have learned mostly about the cost accounting department of the Ford Motor Company through our work in connection with this case. Most of our work has been in connection with taxes and one thing and another.

Q. Well, I would like to have your opinion concerning the cost accounting methods and records of the Ford Company as you have learned them from your familiarity with this case as compared to the systems used by other fairly large manufacturing **(2118)** establishments?

* * * * *

Q. Do you think you have gained sufficient knowledge of the system and records employed by the Ford Company through this period, we will say, from the early part of, let us say, 1924 until 1932 to 1933, or thereabouts, to have or express an opinion? A. I think I could properly express an opinion as to that, yes, In the four years that I have been in Detroit, I have become quite familiar with the cost accounting methods in the automobile industry, both through my connections with Hudson Motor Car Company, and through my work in the cost accounting association here in which the automobile industry is very important; and, I think that some mistake has been made, if I may say so at this time, in assuming that cost accounting methods and practices that are in use in other types of manufacturing industries are applicable to the automobile industry. The **(2119)** whole industry is built up on the idea of mass production and continuous production, which makes quite a different cost accounting problem from industries in manufacturing a great variety of products on the same machines, and in the same departments at different times.

Here a process is set up, and it continues in exactly the same form, possibly for a year, and in as much as some parts are carried on in three or four years' models, a process once set up may not be changed for three or four years. Therefore, there is no need of studying cost by machines, or by small machine groups. We are primarily interested in the cost of a part, and when the process has been set up that cost can be assumed to stay quite constant until they make a material change in the part or the process.

So that I think these departmental costs, such as you have here with this T-410, setting up a monthly figure from time to time of the total cost in the department against production in the department is a perfectly satisfactory method in the automobile industry.

The Master: Do you know whether any other automobile companies in Detroit or surrounding cities attempt to make a more detailed computation of their cost than the Ford Motor Company, going behind the cost of the department?

A. No. I have talked with a lot of them at different times, and I know that a departmental cost, or a part cost, is as far down as they go into detailed cost analysis.

Q. (By Mr. Farley, continuing): Departmental or part cost such as used by the Ford Company on this cost summary card? A. That is right. I would like to go on a little bit with that **(2120)** statement if I may.

Q. Yes. A. It seems to me there are two processes of cost accounting; one is comprising a product both for inventory purposes, and for the eventual use in determining or estimating selling prices, and the other is factory control.

Now, in a great many industries, the cost accounting system is used for the factory control; that is, to determine whether operations are efficient. They get reports through the cost accounting department which show, for example, a direct labor variance for this week of so much money, plus or minus, and they follow those variances, and if they become too great, they go out into the shop and change a process or find out why that inefficiency has resulted.

That object of cost accounting doesn't apply in the automobile industry at all. I don't believe any of them rely upon their cost accounting departments for control of factory efficiency. They rely on just what the Ford Motor Company does, time analysis and time studies, which they generally call minute cost, and they call it the minute cost system, and then these production reports which can be obtained very quickly, perhaps on a daily basis, are the basis of controlling the factory efficiency, and those are made not for the cost department primarily, but for the shop superintendents, and they get their control that way, and not through the cost accounting.

The Master: Wouldn't an automobile company be interested in the question of cost in attempting to determine whether or not **(2121)** it ought to make a certain part of the car itself or purchase it from some other concern, as to whether, for example, it should make its own glass, or buy glass from the glass company?

A. You mean if they are already making glass?

The Master: Either if they are making glass, or contemplating the commencement of such a process?

A. Of course, if they are just contemplating it, the only thing they have is how much the glass cost them on the outside. Assuming they have started to make their own

glass, and they wanted to find out whether it was a good investment or not, of course, they are interested in building up a cost to make that comparison; yes.

Q. (By Mr. Farley, continuing): Would these cost summary cards give the company the information they require as to the cost of a part as compared as to what it would cost them to buy it on the outside? A. Yes, they would. They would get that all right on an actual cost basis. They wouldn't have to have that study made once a month. They might run it through a month, and then they wouldn't feel the necessity of repeating that cost study for, maybe, 6 or 8 months.

Q. Assuming the method employed in these cost summary cards, with which no doubt you are familiar, these cards would show the total hours in a department, and where the department is making just the one part, we will say, if they have the total number of pieces and the total number of production or man-hours, charged up by the timekeeping department, how accurately does that reflect actual cost of the company? **(2122)** A. That is entirely accurate. In other words, that is the actual cost.

Q. That is quite precise on that point? A. Yes. That is what they paid for it, or for the direct labor.

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(2123) Q. (By Mr. Farley, continuing): I think you have already stated the two main purposes of cost accounting, did you not? A. I think I did. I know I started to.

Q. And which of those methods of cost accounting—I think you already have stated, as far as the time studies are concerned as used by the Ford Company, they are used there more as a standard for controlling operating efficiency rather than for determination of the actual cost of the part? A. I would say that the Ford Company does not try to use its cost accounting for shop control at all.

Q. I see. Now, with your knowledge of the system now used by the Ford Motor Company, I would like to know whether it would be your opinion that the Ford Company would or should install a more elaborate system of getting a cost for each of the many **(2124)** operations required in the manufacture of cam shafts, we will say? A. No, I think it would be absolutely a mistake to attempt to develop

a cost system there that would show cost by individual operations.

Q. And, why do you have that opinion, Mr. Russell? What is your reason for it? A. Well, I don't think that any money should be spent on a cost system unless you know that it is going to bring a return, or at least is going to be worth what you spend on it, and I think that the purpose of that would be largely to try to control shop efficiency by the cost accounting, and I think that in this automobile industry, with mass production, they have a satisfactory means of doing that without trying to do it through the cost accounting. In other words, I don't know what the object of such a development would be in the automobile industry.

Q. I was wondering whether you would take into consideration in that respect the fact that in practically most of the automotive plants, shop or operating efficiency in a very large number of instances throughout the plant is really controlled by conveyors at various speeds. Do you understand what I mean by that? A. I think I would like you to repeat it.

Q. What I had in mind was in a great many of the automotive plants, a great many of the departments, operating efficiency, the speed at which operators work there normally, that is controlled by conveyors and conveyor speeds? **(2125)** A. Yes.

Q. Is it not? A. That is right. So that, in the automobile industry your cost accounting should be more like a steel mill, or something like that, where you have a continuous flow of material going through without change.

Q. And, of course, I suppose you had in mind in one of these former answers of yours, that in many of the automotive plants, the manufacturing method concerning a part remains unchanged for a number of years. Is Ford any different in that respect than the other plants? A. The other automobile plants?

Q. Yes. A. No. I think they are just in the same situation.

Q. Except on model T, they kept it up with practically no change for some 15 years? A. That is right. They probably can use longer terms than some of the others.

The Master: Disregarding the question of the cost of a more detailed cost accounting system, might it not

be helpful to the automobile company to have a more detailed system when it is considering, or when the problem arises as to whether a new type of machine should be purchased to perform the operations performed by a given machine at present, to attempt to predict whether the new machine—

A. (Interrupting): Of course, a study like that can often be made, can always be made for a short period of time without setting up a total cost system to carry on repetitive cost reports; an analysis day by day and week by week over a **(2126)** period of years.

* * * * *

(2131) The Master: I was just somewhat interested in this question of burden, and whether or not these so-called fixed costs should be allocated in any way to the machines in question, and a comparison of the cost of the two machines. Of course, if there is a loss shown without the addition of these other items of burden which are not directly attributable to a department, it doesn't make any difference so far as this proceeding is concerned, whether or not there is an allocation **(2132)** of the burden or not, because it doesn't matter how much of a loss there is, if there is a loss there can't be an accounting for it. If there is a profit shown by the use of the Melling machine over another machine which is determined to be the proper standard of comparison, then allocating those fixed costs among the various machines in the Ford Motor Company, if that were to be done it would considerably increase the profit, would it not?

A. Yes, it would, if they were allocated to the machines just on the direct labor basis.

The Master: You do have a lot of cost of accounting and supervision and public relations, and so forth, which are incident to a large business and a large organization, and particularly one which is based on the use of labor-saving machinery which you don't have with a small organization, or one man running his own business, do you? Or, don't you?

A. You mean particularly in a labor-saving machine industry?

The Master: Why, simply thinking of the analogy of a blacksmith shop again, to take some concrete illustration, you have a blacksmith running a shop. He doesn't have to keep any elaborate records, and doesn't have to keep records of what machinery he has in the shop, and he doesn't have any problem of management or supervision. When you start adding machines and increasing the organization, why, you do have a great many expenses which are apart from direct labor expenses, which have to be taken care of out of the profits of the business or out—I shouldn't say profits, perhaps, but out of the proceeds of the business.

A. Yes, you do, your Honor. But, a great many of those, I think, **(2133)** that you have mentioned would come under what the Ford Motor Company calls commercial expenses, which might be left out of our overhead percentages anyway, and the fixed items which are referred to are more items that are included in the overhead burden percentage figures that have been in this case.

You see, over and above these burden figures there is a higher burden, I think they call it commercial. It is frequently divided into two parts; one for selling, and one for administrative in general. But even in the so-called manufacturing burden there are a great many elements that, it seems to me, wouldn't come into any computation of the kind we have here.

The Master: Well, I guess I won't pursue that any further, because I am afraid I am getting beyond my depth right now.

Mr. Spohn: That is all.

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(2136) HAROLD M. WOEHRLE thereupon resumed the stand as a witness, and having been previously duly sworn, testified further as follows:

The Master: Is there any place in these various accounts that you have submitted where you have given consideration to the third cut which certain witnesses testified was taken on the Walcott lathes after the six additional lathes were purchased in 1929?

A. No, if your Honor please, I think that the testimony might have led you to believe that those six machines were used for that operation.

The Master: One witness was specifically asked that question and I believe replied they were used for that operation.

A. Well, I checked into that personally and found out that they had been bought for that purpose, but due to some unusual factor, presumably this lawsuit, they were not put on the line as a third cut, but either replaced or were used in the actual operation of which the others were used.

In other words, I don't believe any third cut was ever employed actually. So, in my computations I have assumed that all 22 machines, after the purchase of the additional six were used in the ordinary operation, and I have computed depreciation on the total 22 machines, as though they had been used on turning operations, first and second cuts.

Re-Direct Examination by Mr. Farley.

Q. Suppose, Mr. Woehrle, the machines had actually been put into production for the purpose for which they were bought, how would **(2137)** that have affected your computation of costs here, as compared to model A shafts, assuming, of course, one would have to assume that you had some record or other evidence of the recollection of employees of the time consumed in performing a third operation; would that have increased or lowered the cost of using the Walcott machines as compared with the shapers? A. Well, naturally that would have increased the cost of the Melling operation, because we would have had to take three cuts using Melling machines, whereas we no doubt would have gotten away with the same production on just one operation of the shapers.

However, I have given all benefit of the doubt and assumed that those six machines were used in regular production, and figured depreciation on the total works, the total 22 machines.

The Master: If the six machines were obtained for the purpose of taking a third cut, and were not used for that purpose, then is it logical to conclude that

sixteen machines would have taken care of the entire production?

A. Well, it is possible that 16 could have, but if you remember my computation, in my comparison of the Mellings with the shapers I also added additional shapers in my computation and figured depreciation on additional shapers; thereby still maintaining the same relationship between the shapers and the Mellings.

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(2141) Re-Cross Examination by Mr. Spohn.

Q. Along the line of this third cut, if the third cut was necessary and was taken, that would decrease the finish grinding, wouldn't it, cost? A. Well, I think you are getting into the realm of probability there. It seems to me that if a third cut was necessary, that would mean that the first two cuts were not sufficient.

• • • • •

(2144) The Master: Do you want to dictate a stipulation on that? Suppose I make a statement and see if it is agreeable to counsel.

Subject to objection by counsel for the plaintiffs that evidence tending to show that the machines made by the plaintiff company could not satisfactorily cut a cam on a Ford cam shaft is entirely irrelevant and immaterial to the questions before the Court in this proceeding, it is stipulated between counsel for both plaintiffs and defendant that the testimony of certain witnesses in the case of Melling vs. Gordon before the Court of Appeals of the District of Columbia in the Patent Interference proceeding before that Court, which was printed in a printed record; the testimony of these witnesses concerning the experience of the Jackson Motor Shaft Company with Gordon machines used in that company for the purpose of cutting cams in a cam shaft is admitted as evidence in this proceeding, said testimony being the testimony of the following witnesses; Otto H. Schultz, appearing in the record at page 132.

Bert Weisel, appearing in the record at page 190.

Frank Steinke, appearing at page 230.

William Cunningham, appearing in the record at page 288.

(2145) And, Charles Gordon, appearing in the record beginning at page 379.

I should further state that the admission of the testimony of these witnesses is restricted to that portion of their testimony which relates to the experience of the Jackson Motor Shaft Company with the Gordon machine.

Any further qualifications or objections?

Mr. Michael: Well, I would like to just make my objection to the relevancy of the matter a little bit clearer, if I may, by stating I object to the testimony as irrelevant on the ground the utility of the Gordon patent is not a proper consideration in this proceeding and, further, if it is directed to the question of apportionment, there is no basis in this proceeding for apportionment.

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(2147) ALEXANDER OBERHOFFKEN was thereupon called as a witness on behalf of the Defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. You live in Rockford here, Mr. Oberhoffken? A. I do.

Q. And, who are you employed by? A. The Ingersoll Milling Machine Company.

Q. How long have you worked for the Ingersoll Company? A. Since 1929; November, 1929.

Q. What is the nature of your duties here; what kind of work do you do here? A. Engineering work.

Q. You were employed by the Ford Company? A. Ford Motor Company, yes.

Q. What period of time were you employed by the Ford Company? **(2148)** A. From 1912 to 1929.

Q. Now, when you were employed by the Ford Company did you have anything to do with the designing of new machinery there, special purpose machinery? A. Yes.

Q. How long did you work on that type of work? A. On that type of work, well, special purpose machinery, if you don't include fixtures, practically from about a year after I got there until I left. Until I left, I was working on it. I worked on fixtures before. Practically worked there all the time I was there on special purpose machinery.

Q. Did you have anything to do with the designing of a cam shaft shaper? A. Yes. I originated the design of that.

Q. When was that, Mr. Oberhoffken? A. It is my recollection around 1914, 1915; something like that.

Q. Now, that shaper was designed for what particular job? A. The shaper, at the time, why we designed it for the model T shaft, cam shaft.

Q. And, were you familiar with the Fordson tractor shaft? A. Yes, I am.

Q. Do you remember how long, when it was Ford started making the tractors? A. We started in production in 1917; we had experimental ones before production started in 1917.

Q. By that time how many of these shapers had been built, if you know? A. Oh, I could not quite recollect. There were enough shapers to do the whole model T production at that time.

(2149) Q. How were you machining the tractor cam shafts? A. We ground them; rough-ground them with grinders.

Q. Why did you not use the shaper on the Fordson job? A. One reason there was not—it was during wartime, and we were in a hurry to get available machinery, and to use the shaper we would have to do some changing around, while we could buy grinders on the open market.

Q. How large was the tractor production? A. Oh, it might have been, maybe, about 30 an hour or so, something like that. It ran—the highest ran about 500 a day. I think that was the peak.

Q. Now, I would like to ask you whether or not the shaper could have been used for machining the tractor shafts? A. Yes, it could have been, with necessary modifications.

Q. Did you at any time consider making any modifications— A. (Interrupting): Yes.

Q. (Continuing): —for using the shaper on the tractor shafts? A. Yes, I did.

Q. And, you discussed this matter with me in Detroit a few months ago? A. Yes.

Q. And, you explained the idea you had in mind at that time. Would you tell the Court when you first considered the proposition of making the necessary modifications to use the shaper on the tractor shaft? A. That was after the war stopped, I had a little time to consider those things, and I went into that making the change.

Q. That was, say, 1919? A. Yes, somewhere around there.

(2150) Q. What did you have in mind doing at that time in so far as the necessary modifications to be made? A. The modification on the shaper, I figured on cutting in both directions, so the tools could cut in both directions, and relieving them individually.

Q. Relieving them individually. By that you mean raising them up individually for the return stroke? A. Yes.

Q. Now, I show you some drawings that were introduced here before Judge Tuttle. I first call your attention to a photograph, Defendant's Exhibit 53. Can you state what that is (handing a document to witness)? A. Yes, that is the cam shaper; the Ford model T cam.

Q. And, here are some drawings which have been marked Exhibit 63 in the trial before Judge Tuttle, and Exhibit 62. Will you state what those drawings are (handing the drawings above-referred to to the witness)? A. Those are assembly drawings of the shaper as it was designed originally; essentially as it was designed originally by me.

Q. And, the driving mechanism used there on the table to reciprocate the work under the tools, will you state whether or not that was a conventional drive for shapers? A. That was a conventional drive for a shaper. I might say, a modification of a—a slight modification of a conventional type.

Q. In this machine of yours, however, it differed from a shaper in that the work moved under the tools rather than the tools moved across the work? **(2151)** A. Yes.

Q. Now, when you told me about this idea of yours in Detroit, you requested that we have some sketches made to illustrate that. A. Yes.

Q. And, I show you the two drawings, Exhibit 268 and Exhibit 269. Will you please, by referring to those drawings, just explain how that machine was to be constructed, and how it would operate (handing the drawings above-referred to to the witness)? A. On the machine as it was built all the tool slides were carried in one big casting, which was moved for relieving the tools up and down in a body. Now, this change would mean that this tool slide during the work cycle would be stationary, would be locked in place, and each slide would individually be relieved ultimately according to the stroke, forward or backward, by a wedge introduced in the tool slide transversely to the movement of the tool slide, this wedge being operated by a cam on a cam shaft, which would not be mounted on this present tool slide. Means would be put on there so that this could be—the cam shaft could be mounted on there, and this cam shaft would be driven in cycle by gearing in cycle with the cam shaft to be worked on.

Q. Now, in the drawing, Exhibit 268, 8 tools are shown, and you will notice some of the tools are marked; four of the tools are marked "T," and four of the tools are marked "T_2," do you see (indicating)? A. Yes.

Q. Will you just describe how those tools would cut, which tools would cut on which stroke? **(2152)** A. Tools "T" will cut, we will call it, on the forward stroke.

Q. That is, with the parts as shown in the drawings now, the cam shaft is in a position to be moved to the left of the drawing? A. Yes. The tools "T" are in a position to start cutting.

Q. Yes? A. While the tools "T_2" are just through their cut, and the tools "T_2" are just being relieved, ready to be raised right now in this position (indicating).

Q. And, the wedge that you were talking about is shown in drawing, Exhibit 269? A. Yes.

Q. And, is marked "W," is that correct? A. Yes.

Q. Now, can you just describe the action of the parts shown in the drawing, Exhibit 269, a little more? As the cam "C," referring to that cam C, was there a cam at all similar to that in the original machine? A. Yes. There is in the original machine, there is a cam similar; but, there is only one cam in the original machine, right here (indicating). This is the cam in the original machine. Just a

minute, I am looking at the wrong part. This is the cam here (indicating).

Q. We have another set of drawings here, Exhibits 254 and 255, and I think on this drawing, Exhibit 255, we put a reference character (handing the documents above-referred to to the witness)? A. On this drawing the relieving cam is up here (indicating).

Q. And, that is marked in lead pencil? A. Yes.

(2153) Q. Cam C.

Mr. Michael: No, that isn't what he is referring to. This is the one, but not this (indicating).

A. No, right on this center here.

Mr. Michael: You see cam C here has an arrow going to this point. That isn't the cam you refer to.

A. No, I don't think that is the cam. The reference line here, the arrow line—the cams revolve around this center here.

Mr. Michael: Hadn't you better mark that?

Mr. Farley: I wonder if you could mark the cam C here, Mr. Oberhoffken, just right where it should be.

(The witness thereupon marked the drawing.)

The Master: You better mark it with another designation.

The Witness: That is correct. This cam C comes around here.

Q. (By Mr. Farley, continuing): And, the arrow line that is on the drawing is correct? A. It is correct. It is this shape here. The roller contacts this one here. This consists of two cams next to one another; one for the up movement, and one for the down movement. It is necessary to have that or the cam will not work the proper cycle.

Q. Now, I show you these drawings, Exhibits 254 and 255, and you have seen those drawings before with those crayon changes on there (handing the documents above-referred to to the witness)? A. Yes, I have seen them several months ago.

Q. Now, do you understand what is shown in those drawings, **(2154)** Exhibits 254 and 255? A. Yes, I do.

Q. Will you explain your understanding of that modification as shown in those drawings with the crayon, and we have some other drawings here? A. This drawing shows an auxiliary slide mounted in front of the machine which carries extra tools for the cams that can not be machined by the regular slide. And, this slide has movement—well, I don't know how to describe that movement—that is a differential movement, I would say, in relation to the tool slide, in such a way the tools will catch up with it and machine the shaft in such a manner. If I had the shaft I could probably—

Q. (Interposing): Explain it a little better? A. Yes.

Q. Well, we have some drawings of the shaft here. This is Exhibit 257 (handing drawing to the witness). A. I mean by differential movement that this slide has twice the movement of the shaft slide, and by that means this slide moves at twice the speed in order to catch up with that, in order to machine the cam.

Q. Now, I would like to ask, Mr. Oberhoffken, if you consider the attachment as shown in these drawings, Exhibits 254 and 255, 256 and 257, as being a practical construction? A. Yes, I do.

Q. Do you think you would have any difficulty in manufacturing a construction of that kind? A. No.

Q. And making it work? **(2155)** A. No, I don't think so.

Q. How about the construction that you contemplated for the model F shaft, and which is shown in these drawings, Exhibit 268 and Exhibit 269, would you consider that a practical construction? A. Very much so, very much so. That is the solution I had in mind when I figured on using it for the tractor shaft.

The Master: How far did you go with this idea back in 1919? Did you have any plans made?

A. I had some plans made of this one. I made some sketches of a similar arrangement of this one. Bricker and I had layouts made of some other methods.

The Master: Why was nothing done to consummate your plans?

A. Well, at the time, you know, we didn't have very high production, and it was not considered advisable to build any equipment for that at the time.

The Master: Do you know what happened to those plans you made at that time? Were they preserved in the Ford Company files?

A. No. I don't know. They were drawings, brown paper drawings, and probably were thrown away.

The Master: Just rough sketches?

A. They were more or less sketches, yes; kept around awhile and thrown away. They were line drawings, but thrown away.

Q. (By Mr. Farley): Let me ask this, as far as drawings 268 and 269 are concerned, you explained the idea shown therein to Mr. Brush? A. Yes.

(2156) Q. And, he had these drawings made. I sent these drawings on to you shortly after they were made for your comments, or as to whether you wanted to make any changes, whether they correctly represented your idea? A. Yes.

Q. And as I didn't hear from you about it, I assume you found no comments or corrections to make? A. I thought I did write you a letter that I considered them correct. I did when I got them.

Q. Maybe you did, but I don't remember. A. I could look up the file. I thought I did.

Q. I would like to ask you this, as far as all of the mechanism shown in drawings Exhibits 61 and 62— A. (Interrupting): Which ones are those?

Q. Those are these original prints. As far as all of that mechanism is concerned, would it— A. (Interrupting): This is the original design, this one (indicating).

Q. That is Exhibit 255? A. Yes. This other one, the one I saw first shows a modification of the location of that cam.

Q. I see. That is, Exhibits 61 and 62 are a modification of the original drawings as shown in Exhibits 254 and 255, is that right? A. That is right.

Mr. Michael: That is Exhibits 62 and 63.

Mr. Farley: Yes, Exhibits 62 and 63; that is right.

Q. (By Mr. Farley, continuing): Now, as far as the remainder of the mechanism as shown in those original drawings of those **(2157)** shapers is concerned, would

there be required any changes, or what changes, if any, would be required in those to adopt the machine for the tractor type of job as you show it in sketch 268 and 269? A. The relieving cam here (indicating), shall we call them?

Q. That is the cam C we have been talking about? A. Yes; would be removed, and provision would be made by a screw or something to lift up the slide out of engagement, or leave it in position.

Q. What would be the purpose of that? A. To get the work out, you see.

Q. Did you have any provision of that type in the original shaper? A. Yes. We have—we wouldn't have to make that because it is already there. There was an eccentric on the pivot shaft to move that up, so the cam could be disengaged and locked stationary, and then you can move the slide in and out by moving this eccentric by the same way as it was done originally.

Q. Originally was that a means whereby at the end of the cycle the cam, the whole slide, moved up automatically? A. Yes.

Q. And you would retain that? A. Would retain that, yes.

Q. I see. A. Then, on the front of the slide you would have to add a bracket carrying the wedges and the cam shaft, the new cam shaft for relief.

Q. As shown on this drawing, Exhibit 269? A. Yes.

Q. And that would be the only changes required in the machine? **(2158)** A. Yes. And, you would have to provide means for driving this cam shaft from the same place, you know, where formerly you drove the shaft here (indicating). It has to be in cycle.

Q. Would the cam C shown in drawing, Exhibit 269, would that be driven on the same shaft, or from the same shaft as the cam C? A. As this one here, yes. That is what I mean. It would be driven from that at the same speed, the same relationship. It would have to be geared over.

Q. And you would use, of course, in your, what we might call, double action shaper, one cam C for each of the tools? A. Each of the tools.

Q. That would be 8 of those cams altogether? A. 8 of those cams altogether.

Q. Now, the drawing, Exhibit 268, does show some modification in so far as this yoke "Y" is concerned over the yoke for driving the table as shown in drawings, Exhibits 62 and 63, doesn't it? A. This modification is made to give the cam shaft slide the same speed forward and backward, since we are cutting now on both strokes back and forth.

Q. Did you consider that at any earlier date when you were thinking of this other construction? Did you have that also in mind? A. Yes, I had that also in mind. Of course, it is not essential for the operation of this.

Q. Just what do you mean, Mr. Oberhoffken? A. Because it would not cause any harm if that went faster or slower in the other one. If you didn't want to go to the (2159) expense of doing that, you wouldn't have to do it.

Q. You could use the same drive? A. The same drive. The speed on the tools is so slow that the higher speed on the other tool would still be workable. It would have unequal speed, but it still would be workable.

The Master: If you were building another machine, would it be any more expensive?

A. This would be cheaper.

The Master: This modified?

A. This modified would be cheaper, but on a changeover of a machine you might leave that off.

Q. (By Mr. Farley, continuing): During your period of service there at the Ford Company, Mr. Oberhoffken, was this the first special purpose machine you had designed? Was this cam shaft shaper the first special purpose job— A. (Interrupting): No, I don't think so. I had been there for several years, you know.

Q. About how many special purpose machines would you say you had designed at the Ford place? A. Oh, I have been on it for 2 or 3 years, you know; there must be, maybe, a half-dozen or dozen, you know, different kinds.

Q. When you design a special purpose machine of that type, what do you use as a starting point, we will say, for the machine you are going to design? Do you understand what I mean? A. Yes. Well, there is no special formula for that, exactly. Sometimes, you know, when somebody has got an idea, there is really nothing to go by,

merely that production cost is too high, you know, as it happened to be in this case.

(2160) Q. Production cost of what? A. Of this particular operation, as previously performed.

Q. But not as performed on these machines, on these cam shaft shapers? A. Yes.

Q. What I had in mind was this, if, in the engineering department they design a shaft, a cam shaft? A. Yes.

Q. Was that really what you had as your starting point? A. Yes.

Q. For the designing of this machine? A. Oh, yes, I had that, if that is what you mean. We have the engineering drawings for a start.

Q. Did you consider any other methods of machining the cams on these model T, besides this shaper principle that you did use? A. Yes. I considered milling and turning before I considered the shaper method.

Q. And, why did you adopt the shaper method? A. Because it seemed to me, you know, that it was the simplest matter, which my superiors and others agreed with me; it was a simpler matter.

Q. During your period of service there in the machine designing department at the Ford Company, did you ever make it a practice in that department to reconsider, or consider, a change in the design of any of the parts that were going into the car to help out production? A. Yes. That was done very frequently.

Q. And, do you know enough about the operation of an automobile engine, and particularly the cam shaft, to state whether or (2161) not any modification might have been made in the design of either the tractor or the model A shafts that would enable those shafts to be made on the cam shaft shapers without any change in the shapers? A. Yes.

Q. The tractor cam shaft was very much larger than the model T, was it not? A. Yes, considerable.

Q. Whereas, the model A shaft has the same spacing of the cams and the width of the cam is the same in the model A? A. Yes.

Q. Mr. Pioch testified, Mr. Oberhoffken, that it would have been perfectly feasible and practical to have cut a quarter of an inch off the two large bearings which inter-

fered, and then to have used the model T cam shaft shapers as they were without change.

Mr. Michael: I object to that question, telling this witness what some other witness has said, and then asking him if he agrees with that. That is about what it amounts to.

The Master: I think you might better ask the question direct, rather than referring to Mr. Pioch's testimony.

Q. (By Mr. Farley, continuing): Well, would it be feasible or practical, in your opinion?

Mr. Michael: Why not ask him what he would suggest in the way of changing this shaft?

Mr. Farley: All right. You can answer the question that way.

A. Well, it would have been possible, you know, to provide clearance **(2162)** on this cam which is closest to the bearing. You might have taken some off the cam, you know, and some off the bearing to provide, say, instead of as I recall it is about 3/16 of an inch—so it would get about 3/8 of an inch, and in that case we would have been able to get a tool in it.

Q. (By Mr. Farley, continuing): You consider a clearance space there of 3/8 of an inch ample? A. We would have to design a different tool, a tool with a body. Perhaps, the tool would be made wider to get the body. It would be narrow, say, in this direction, a flat tool (indicating), with a point on there. In that case we would have been able to get along with about 3/8 of an inch which, in my opinion, was perfectly feasible to do in the design.

Q. Were there any instances of any changes of that type made in the design of any of the parts for facilitating production while you were there? A. You mean in general—

Q. (Interposing): In general. A. (Continuing) —on my part? Oh, yes. It was done quite frequently; quite frequently.

Q. I show you a computation, Exhibit 264, and ask you if you understand that (handing document to witness)? A. Yes, I understand that. That is essentially,

you know, what we figured on at the time, and what they were running to my recollection.

Q. And that is a computation of the speeds and feeds? A. Yes.

Q. Speeds for cutting per minute, and feed of the cam shaft shaper as designed by you? **(2163)** A. Yes.

Q. Now, I show you a couple of drawings, Exhibits 260 and 261, and I will ask you if you know what they are (handing drawings above-referred to to the witness)? A. Yes, I remember them very distinctly, because I designed those myself; I mean, originally, the original part. This one illustrates the part, the sleeve on the end of the tail stock, with a bayonet lock on there for quick action of the tail stock. I designed that first one, I might say, around 1913, or around there, 1914, or sometime.

Mr. Farley: I might say, for the purpose of the record, these are the drawings produced by Mr. Pioch to show the construction of the quick-acting tail stock that was used on the Reed Prentice machine.

A. I can tell you when the first one was used. I remember. It was used on the rear axle drive shaft tubing to perform some operation. We had a longer pilot going in there, and it took a long time to get that out, and I had the idea to make this mechanism. We just took a steel sleeve, and pressed it on the back, and put a pin in there in order to get this pilot out of the rear end.

Q. What type of lathe did you put that original one on? A. Just an ordinary engine lathe. I think it was a Reed Prentice, by the way, too, which we most of all used, Reed Prentice, at that time.

Q. Do you happen to know whether or not Reed Prentice uses that construction now? A. I think they do.

Q. It was my understanding that quick-acting tail stock which you **(2164)** designed in 1913 is more or less standard now on lathes? A. Yes, I think so.

Q. I show you a sheet of paper which is marked Exhibit 61, and will ask you to read that description there, and state whether or not it is correct (handing document to witness)? A. (Examining document): No—

Mr. Spohn: (Interposing): If your Honor please, I don't think it makes much difference, but that ques-

tion calls for this witness, sort of impeaching a sworn affidavit of defendant's prior witness before Judge Tuttle.

A. That is not correct, the statement about the cutters moving; that is not correct. It is the shaft that moves.

Mr. Farley: That is not an affidavit that was made before Judge Tuttle; it was a paper filed.

Mr. Spohn: I say it was an affidavit sworn to, and filed as an exhibit before Judge Tuttle. That is what I meant.

The Master: Well, the question is worded in a form which makes it seem objectionable. I suppose it would be proper, however, to ask the witness a direct question as to whether the cutters did move from left to right. You can ask him about how the cam shaper operated.

Mr. Farley: I think he has already said that.

The Master: Yes.

Mr. Farley: I don't think it is of any importance, anyhow.

Q. (By Mr. Farley, continuing): I think you said a little while ago, Mr. Oberhoffken, you considered other methods, milling and turning, at the time you first designed your cam shaft shaper. What method, if any, of turning did you have in mind? **(2165)** A. Turning? We made some sketches or lay-outs on ordinary paper to turn the shaft and move the tool in and out, and rocking it about this point (indicating) with the tool held into a little segment, you know, sliding segment, up and down, and that segment operated by a cam shaft in the back.

Q. Why did you not adopt that type of construction? A. After that, you know, I got the idea of the cam shaper, you know; we considered that simpler, and a more foolproof machine. And, furthermore, we found that our production, if anything, would be higher on the cam shaper, from our calculations. It would be higher definitely.

The Master: Why did you think you needed to rock the tool back and forward? Why didn't you just let it move in and out?

A. Well, we considered it at the time necessary, you know, in order to prevent, to keep the proper clearance angle on the tools.

The Master: Did you have in mind an end cutting tool, or side cutting tool on the operation?

A. Just an ordinary tool, you might say, lathe tool.

The Master: Was the tool going to cut on the end?

A. On the edge. The tool was forwarded across the shaft.

The Master: If the tool was forwarded across the shaft, would it do its cutting on the end of the tool, or take off the side?

A. Yes.

The Master: Which is it?

A. I would call it the side.

The Master: And, you would rock the shaft to get the **(2166)** proper clearance?

A. Rock the tool.

The Master: Or, the tool, rather?

A. To get the proper clearance angle on the tool. In other words, the reason for that is to maintain better life for the tool.

Q. (By Mr. Farley, continuing): How long have you been familiar with the machine tool industry, Mr. Oberhoffken? A. In which way do you mean that? As an industry or with machine tools in general?

Q. Both machine tools in general and the practices and methods used in the machine tool industry. A. Well, I might say, that is coincidental. My entrance in the business was in 1906 with Olds Motor Works in Lansing. I worked originally as a lay-hand, and later as a toolmaker and tool designer. Since that time I have been in it all my life; I have never been out of it.

Q. Do you know of any instances in the machine tool industry where the user or the manufacturer of the machine, rather, sells a machine on the basis of the purchaser paying so much per piece for each piece turned out

by the machine? A. It has never come to my notice that I know of, that I can recall.

Q. Does your company here—the Ingersoll makes a great many heavy-duty and large production machines? A. Yes, and small machines, also.

Q. Do you sell any of your machines on the basis of the purchaser paying so much per piece? **(2167)** A. None whatever. We have not sold any since I have been here.

Q. What would be your knowledge, if any, concerning the relative cost of turning these shafts in the Ford Motor Company, either model T or model A, of shaping the shafts, the contours of the cams by the shaping method, as compared with turning them?

Mr. Spohn: Just a moment, if your Honor please, the witness has offered no experience in cost.

Mr. Farley: I asked him what knowledge, if any, he had.

A. I know of the time we could do it on the shaper, but I have no personal accurate knowledge of the time on the turning method. I have no direct knowledge of the turning method, of what it takes; no personal knowledge.

Q. (By Mr. Farley, continuing): Would you have an opinion on the matter? A. Yes. That goes back, you know, to the investigation I have made; I consider that the shaper is the faster method.

Q. Now, you have observed the shapers which you designed, of course, in operation in the Ford plant? A. Yes.

Q. Do you know whether or not you had to employ a straightening operation on the shaft just before they were put into the shaper? A. No, we did not.

* * * * *

(2169) Q. (By the Master) You said at the time the shaper was designed you gave some consideration to the milling method of shaping cams. You were already using milling machines for that purpose, were you not? A. Yes. We were using form cutters setting, milling the shape lengthwise. That is not the method I was considering. I was considering a milling method which would work simultaneously on all cams, while the method we were using was working step by step from one cam to the other.

The Master: Do you know what methods the other automobile companies were using to rough machine cams during the period, say, 1920 to 1928, roughly?

A. They were either grinding them, rough-grinding them, a lot of them were, and a lot were using the turning machines.

Mr. Spohn: What was the last, either rough-grinding or turning?

A. Yes.

The Master: Before they began to install any turning machines, do you know whether any other companies besides Ford in the automotive industry were using other than grinding machines for that purpose?

A. They were using, before we had shapers in the earlier days, they were using the method of milling the same as Ford did.

The Master: But, they discarded that method?

A. They discarded it in favor of rough grinding.

The Master: Do you know why the Ford shaper wasn't copied by other automobile companies for that purpose?

(2170) A. No; there was no other company at the time than the Ford Company that would go into building elaborate machines like that, no other automobile manufacturer. I considered that one time myself I would like to start up something by building shapers which would be, of course,—would have been considerable faster than the shaper we actually had. Our shaper was limited due to its weight of the ram.

The Master: Due to what?

A. The weight of the ram. It was too heavy, and that limited the speed that we could travel it; limited production. I considered it several times; any new machine I would have designed from the bottom up would have twice the speed we had then.

Q. (By Mr. Farley, continuing): That speed of the ram, that was the limiting factor? A. The limiting factor; not the cutting speed.

The Master: Did you have anything to do with the purchase of additional shapers, or the ordering of additional shapers around 1923 and 1924?

A. No. 1923 and 1924 I was doing special work, you know; Mr. Ford, you know, in Dearborn, I was in the engineering laboratory after the tractor plant was transferred to the main plant.

The Master: You didn't even know such machines were being ordered?

A. Eventually I found out about that; I happened to be interested in that particular work.

Q. (By Mr. Farley, continuing): You were not consulted at all **(2171)** prior to the ordering of those machines? A. No.

Q. And, were you ever consulted prior to the Ford Company buying these lathes for turning their cams? A. No.

The Master: Did you ever communicate to other designing engineers in the Ford plant your idea about speeding up the shaper by a modification?

A. Well, I did, you know, talk about that. I talked to Mr. Emde at the time that the shaper could be speeded up a lot.

The Master: The way you were going to do that was by reducing the weight on the ram?

A. By reducing the weight on the ram.

The Master: How would you do that, by using another kind of material?

A. Lighter. Either steel or aluminum alloy construction; make it a lighter construction, and making the driving mechanism stronger so you would get better bearing surfaces on that, so you would be able to absorb the shocks and the pressure generated by the higher speed, the return motion. It would be just a general re-design, a detail re-design working on the same general principles. An instance of where that was done was by the Fellows Company

after, you know, after we designed the cam shaper, about that time we wanted to buy gear shapers for a triple gear on the transmission. The standard gear shapers were too slow; they couldn't speed them up, because they had too much weight. I designed and laid out a machine that would work much faster, with a faster stroke. By that time the Fellows Company went **(2172)** ahead and did the same thing. They designed a high-speed shaper which had about two or three times, at least double the speed. When that happened, we bought them. Standard machines could not—I mean we didn't figure on using them, because they were too slow, but they speeded them up by reducing weights and motions.

Q. (By Mr. Farley, continuing): You said something about the Ford Company being—other manufacturers not having a sufficiently high production, or that Ford was the one who would only build special machines? A. Yes. As far as I know at that time, you know, they hadn't anybody else, you know,—they didn't go into building special machines for themselves so much. They relied more on the outside supply, machine tool manufacturers, than we did.

Mr. Farley: I think that is all. You may cross examine.

Cross Examination by Mr. Michael.

Q. Mr. Oberhoffken, at the Ford plant did you have anything to do with the design of the internal combustion engine, or parts thereof? A. No.

Q. I think you said that the shaper was the faster method, according to your investigation, and by that I think you meant the investigation you made at the time you designed the shaper. Was that in 1914 or 1915? A. Somewhere around there; yes.

Q. Then, you concluded that after investigating the turning of the cam and the milling of the cam? **(2173)** A. Yes, sir.

Q. When did you go into the tractor department, Mr. Oberhoffken? A. 1917.

Q. That was when they were first getting under way? A. When we first went into production.

Q. Was it on your recommendation that they started out grinding the F shafts? A. Well, yes,—it wasn't di-

rectly, no, I couldn't say on my recommendation, because Mr. Bricker and I together, we laid out operations, and we used available commercial tools at that time.

Q. How many grinding machines did you have in that department when you first started? A. I think we had only one.

Q. And, that was a new machine? A. I think so. I couldn't tell. It might have been a machine taken over from the main plant. I couldn't recollect that now.

Q. You weren't grinding cams anywhere else in the plant, were you? A. Oh, yes, we were finish grinding them. There was no difference between the rough grinding and finish grinding machines.

Q. So, you might have taken a finish grinding machine over? A. Yes.

Q. You don't recall which you did? A. No. I think we had new ones, but I couldn't definitely say.

Q. How long after you got this one grinding machine was it that you began to add others to take care of the production of the F shaft? A. I couldn't say. Of course, it went on as it was required. I **(2174)** do not recall the production of those grinders.

Q. Do you remember how many grinders you had doing the rough grinding on your F shafts at the peak of your production? A. No, I don't.

Q. You wouldn't know whether it was two or fifteen? A. Well, I would know it wasn't fifteen, or anything like that.

Q. Could it have been as many as seven or eight? A. Rough grinding? No.

Q. At the peak of your production? A. I don't think so. I don't think it could have been more than three or four, you know.

Q. What was the production on the rough-grinding machines with the F shaft?

Q. That, also, I can not recollect. I would have to reconstruct it. It might have been 10 an hour, or something like that, I would offhand judge, but that is just a guess. It comes from my general knowledge of what I know of the operation; not from my recollection.

Q. And, it wasn't until after the War, as I understand it, some time in 1919, that you got in mind the possible change in the shaper to take care of the work? A. Yes.

Q. In other words, two or three years after you started making the tractor? A. Yes, possibly two years after that.

Q. But nothing was ever done with the suggestion? A. No.

Q. When did you first see or have anything to do with this so-called attachment shown in Exhibit 257? Do you know what I **(2175)** mean? A. This here?

Q. No; this shown in crayon (indicating). A. Sometime last fall Mr. Farley showed it to me, and Mr. Brush.

Q. You had never seen anything like that prior to that time? A. No.

Q. In order to load the machine of this Exhibit 268, I understand that it would be necessary to raise all these toolholders up? A. Yes.

Q. And that you do, you would raise them all up as a unit, is that it? A. As a unit, the same as we do on the other.

Q. And in addition to that you would have to have a special mechanism for alternately raising and lowering every other tool? A. Yes.

Q. During the actual cutting? A. Yes.

Q. And, this cam C here in Exhibit 269 is the cam—let me ask you, first, is there one of those cams C for each tool? A. For each tool, yes.

Q. And, the purpose of that cam is to permit the toolholder to have a relieving stroke? A. It takes the place of the clapper box on an ordinary shaper or planer.

Q. So that with every cycle of the machine that cam would allow the tool to raise, and would later allow it to be lowered and take a cut? A. Yes.

(2176) Q. And there was nothing like that in your old machine, was there? A. Not the same construction. In the old machines the tools were raised as a unit.

Q. You have got to have that in this machine, Exhibit 269, too, haven't you? A. No.

Q. How do you raise the tools as a unit in the machine of this drawing? A. You could do that by an eccentric bushing the same as we had to do that; that was additional on the old one from the relieving mechanism.

Q. Do you mean to say whatever you used in this machine Exhibit 269 for permitting all the tools to raise as a unit corresponded to the raising of the tools as a unit in the other machine? A. Yes.

Q. More than this cam C corresponded to that? A. The cam C has nothing to do with raising all the tools, I mean as a unit.

Q. No. Well, therefore, there is nothing in the old machine, or was nothing, corresponding to the cam C? A. Yes, there is; there is a relieving cam.

Q. But that permitted the tools all to go up? A. It is not used for that purpose.

Q. In the old machine? A. It is not used for loading the machine.

Q. You mean the cam C in this drawing, 269, isn't used for loading? **(2177)** A. And, the cam C, the corresponding cam C, is not used in the old machine for loading.

Q. But, it is used for raising the tools as a unit? A. Used for raising the tools as a unit for relieving the tools on the work stroke only.

Q. I think we understand one another. In the old machine there was one eccentric, is that right, on a shaft, similar to the shaft on which the cam C is mounted? A. On the old machine there is one eccentric on the pivot of the first machine, on the pivot of the arm for the relieving arm, and there was also a set of cams alongside of it that do the relieving of the tool on the back stroke.

Q. A set of cams? A. I should say there are two cams. It actually acts as one cam. We have two cams. Here we have a spring, and with the old one, there are two cams side by side for going down and up.

Q. And the two cams act as one? A. And the two cams act as one.

Q. And operate the whole head up and down? A. And operate the whole head up and down.

Q. Whereas, this cam C in Exhibit 269 is peculiar to each tool-holder? A. Peculiar to each tool-holder.

Q. And each cam independently operates its own tool-holder? A. Yes.

Q. And has nothing to do with the head going up and down? A. No.

Q. For the head going up and down you have a separate mechanism in this machine of Exhibit 269? **(2178)** A. Yes.

Q. And, that isn't in the old machine? A. To move the head up?

Q. And down? A. For loading. There is a mechanism in the old machine for moving the head up and down for loading.

Q. Was that a hand operation? A. As I recollect, that is a hand-operated means.

Q. And that was something in addition to the two cams? A. I can't offhand recollect, but I think that is a hand-operated machine.

Mr. Farley: Do you want to consult your drawings on that, and your photograph?

A. (Examining documents): In the old machine for raising, I think this is the hand wheel here (indicating), that operates this eccentric bushing here. This eccentric bushing raises the tools up for loading purposes, and this cam here operates them for relieving.

Q. (By Mr. Michael, continuing): The two cams for relieving in the old machine were automatically operated? A. They are automatically operated.

Q. But, the raising of the head up and down for loading is by hand? A. Yes.

Q. And, in this machine of Exhibit 269 the cam C, there would be eight of those cams? A. There would be eight of those cams on one shaft.

Q. On one shaft, and they would each operate the corresponding tool-holder for relieving? A. For relieving.

(2179) Q. And, in addition to that you would have what for raising the head up? A. If I built over the machine I would leave this eccentric as it is, and lock this arm in place.

Q. What arm? A. This here. I would lock this arm so it can not move. I keep this shaft stationary, I mean, the cams in position.

Q. You mean you would lock the shaft on which you had these cams C mounted? A. Yes; I would lock them in place.

Q. You would lock them first? A. Yes.

Q. And then operate? A. Then I would operate this eccentric bushing.

Q. You would operate the eccentric bushing by this hand wheel in order to turn the whole head up? A. Yes. That is, if I change over the machine, with the minimum amount of change.

Q. Now, when the tool-holders in the machine of Exhibit 269 are raised, does this plunger, marked R, in the print 269, also move? A. No. This is stationary; it slides on this surface here.

Q. The head of the plunger slides on the head—that is, the head of the plunger R slides on the head of P? A. P.

Q. I think you said in your direct examination that the traveling of the work bed or carriage in the old shaper was the conventional work feed, shaper work feed? A. Yes.

(2180) Q. But, you added that it was slightly modified. In what way was it modified? A. I don't know. After I say that I couldn't think which way it was really modified. Yes, it is modified—that is what I meant; in the conventional machines it is adjustable. This one it is not.

Q. In the old shaper? A. In the regular shaper, standard shaper, it is adjustable. The block on the crank is adjustable in throw, which modifies the lengths of the strokes. That is what I meant.

Q. When did you first discuss this thing that is shown here in this Exhibit 269 with Mr. Farley? A. Last fall sometime; I don't remember the date.

Q. And did you do anything with reference to the idea from the time you first got it up to the time Mr. Farley talked to you about it? A. No, not since 'way back; I was not in a position.

Q. I think you said in connection with Exhibit 269 you would have to have a bracket to hold something or other. I just didn't understand that. A. Well, I mean there is a plate in front of here that has to incorporate, you might call it a bracket, you know, or housing to mount this shaft in.

Q. You mean a plate in front of the tool-holders? A. That has to be ground with a bracket cast on there to carry this shaft and those slides.

Q. To carry the shaft that carries the cam C? A. Yes.

Q. And, also, the plunger R? **(2181)** A. Yes.

Q. And all of that structure that you just described, as being out in front, would be stationary with respect to any movement up and down while the rest of it would have to be movable? A. It is stationary with regard to the relieving mechanism, but it would go with it on the loading.

Q. Oh, on the loading and unloading, when you move the whole head, then the attachment on the front, as well as the tool-holders, would all go up as a unit? A. It would be as a unit with the present slide; it would be a unit with that.

Q. And, of course, in that respect it would differ from the old shaper, too, wouldn't it? A. Yes.

Q. You had nothing like that in the old shaper? A. There isn't anything in front; no.

Q. And, in the old shaper you had nothing that required an accommodation of parts or mechanism to an independent movement of the tool-holders and the unitary movement of the tool-holders and all the rest of the mechanism? A. Not on the tool-holders, no. There was nothing on there.

Q. There wasn't anything, no requirement for anything like that on the old shaper? A. No.

The Master: Did you ever consider this modified form of shaper for shaping the model T cams, or did you have in mind its use solely on the tractor cam shaft?

A. Well, I was working—I had that in mind, that modified shaper, for any of them, just as well for the model T as for the **(2182)** tractor. That would have been applicable for both, but I was working toward the tractor cam because that is at the time where I was. I was responsible on the tractor.

The Master: Do you consider it would be better for the model T than the shaper that you originally designed?

A. Yes, I would have sped up production. By the cutting speed it would have speeded up at least two to one, and probably increased at least 50 per cent the total production.

The Master: How could it have speeded up two to one?

A. Because the cutting speed is very low on this shaper. The limiting factor is the speed you can move the ram.

The Master: Well—

A. (Continuing): And, the cutting speed can be multiplied by two without damage to the tools.

The Master: Are you speaking now of a modified ram?

A. Modified ram, yes.

The Master: I was limiting it to this.

A. You are referring to this?

The Master: Yes.
Mr. Michael: Exhibit 269.
The Master: 268 and 269.

A. There is no necessity for it on the model T cam shaft.

The Master: You wouldn't consider there would be any advantage in using that on the model T?

A. No, no necessity for it.

The Master: Would this shaper as embodied in Exhibits 268 and 269 be more expensive to build than the shaper for the model T?

A. Yes, it would be slightly higher.

(2183) The Master: Would it be more likely to get out of order and require more maintenance?

A. No, I don't think so.

The Master: Wouldn't that additional mechanism you have for relieving the tools cause complications and be likely to get out of order?

A. No. Those are mechanisms, you know, very commonly used; with the use of the proper materials on there, there wouldn't be any greater maintenance on it. It would have cost more to build, you know, those parts.

Q. (By Mr. Michael, continuing): Mr. Oberhoffken, how much of an investigation did you make back in 1914 and 1915, or whenever you made it, with respect to turning and milling cams? A. Well, it consisted of making layout drawings, you know. There was no other experimentation made.

Q. And, I think you said, in addition to the milling, you considered turning by moving a tool in and out, and tilting the tool? A. Yes.

Q. Did you at that time give any thought to moving the tool in and out without tilting it in an ordinary lathe operation? A. We did.

Q. And what did you conclude about that? A. What?

Q. What was your conclusion on that? A. My conclusion at the time there, you know, by that our clearance angles would have to be such that they wouldn't stand up.

Q. I think you said on your direct examination that in the business here at Ingersoll Milling Machine Company no machines **(2184)** were ever sold on the basis of a royalty of so much a piece on the pieces produced on the machine? A. No machines that I know of.

Q. Do you have any knowledge of that practice in any other industry? A. Well, just in so far, you know—no, I have no knowledge of that being done any place.

Q. You have no knowledge that it is done any place? A. No.

Q. Have you ever had occasion to look into questions of that kind? A. No, I have not.

Q. So that any knowledge you would have would be just knowledge you picked up? A. Picked up.

Q. As you go along from day to day? A. As I go along from day to day.

Q. Did you make any lay-outs when you made your investigation of a machine or method for turning cams with a lathe tool where the tool would just move in and out and not tilted? A. Yes.

Q. You did. But, discarded it as impractical? A. Well, we discarded it as, I wouldn't say impractical—yes, in a way. Of course, we considered the clearance angles, you know, too steep for practical use, for tool life.

Mr. Michael: I think that is all I have.

(2185) Re-Direct Examination by Mr. Farley.

Q. I don't know whether there is any confusion or not, but in the original model T cam shaft shaper you did have a cam, which has been referred to as a cam C, which raised all the tools for relieving purposes? A. Yes, for relieving.

Q. And, in the modified machine, as shown in Exhibit 269, you are still going to use a cam for that purpose, is that right; that is, for relieving? A. For relieving.

The Master: Separate cams?

A. Separate cams.

Q. (By Mr. Farley, continuing): The difference being you would use 8 separate cams? A. Yes.

Q. And, as far as the mechanism for raising the head for loading and unloading purposes, you would employ in your modified machine the same mechanism as was in the original machines, it is my understanding? A. If I used the same machine. If I changed them over, if I made a new machine, I would simplify that mechanism due to this construction here (indicating).

Mr. Farley: That is all.

The Master: If you assume you have the same type of ram, and the same type of metal in both machines, comparing the original shaper with this modified shaper, 268 and 269—

A. Yes.

The Master (Continuing): —is there any advantage or **(2186)** disadvantage so far as speed is concerned in being able, with this modified shaper, to have the backward and forward movement of the work piece constant, whereas it was twice as fast in the forward movement in the old shaper?

A. No. There is no difference. When we made the original shaper, we did not know how fast we could move, and we didn't know what the limitations would be. We didn't know if we could move fast enough so that the cutting speed became our limitation. We did have an advantage in having the cutting stroke go slow and return fast, but as it turned out we could not go quite that fast up to the cutting speed. With this model T here, we increased the cutting speed slightly, but it is far below what is practical. The cutting speed backward and forward is increased above what it is on the original shapers.

The Master: That cutting speed is increased, but the movement of the tools is less rapid than it was in the non-cutting stroke in the original shaper?

A. It is less rapid, but faster than the cutting stroke.

The Master: Is it half-way in between?

A. It is approximately half-way in between the two. If the other one is 2 to 1, it is exactly half-way in between.

The Master: You have exactly the same speed for a complete stroke with both forms of shaper?

A. Yes.

The Master: That is all.

Q. (By Mr. Farley, continuing): That being the case, having exactly the same stroke with each form of shaper, would you, in this modified form, increase the—would there be any increase in the cutting time because your model F cam shaft, or **(2187)** cams, were wider than the model T? A. I wouldn't know exactly how much clearance we had on there. If it is very much wider, it will slightly increase the cutting time if I kept the same conditions all the way through.

Mr. Farley: That is all.

RE-CROSS EXAMINATION by Mr. Michael.

Q. That brings up one more question. I think on direct examination, Mr. Oberhoffken, you spoke of changing one or two of the tools, making them smaller, where you didn't have enough clearance? A. That referred to providing clearance between the cam and the bearing.

Q. Yes. A. And, I was referring I wouldn't have enough room to get those tools in here.

Q. Which tools? A. This kind of tool we have here (indicating).

Q. The one you have shown in this Exhibit 268? A. Yes.

Q. Then, in the use of this machine, Exhibit 268, on an F shaft, what would you have to do to the tools? A. I would have to make a flat tool. As a matter of fact, the way this is shown here, I could almost use another ⅛ of an inch here; I could put another tool in here and use the shaper as it is with the same construction.

The Master: Another eighth of an inch off the center bearing?

(2188) A. Yes. I would put a flat tool in here; the tool in front would look something like that (indicating). I keep the point this way.

Q. (By Mr. Michael, continuing): You are speaking of the old shaper, or this shaper 268? A. Of the old shaper. I would put a tool like that in here, and increase this 1/8 of an inch, and I could use the old shaper with the same construction.

Q. Did that occur to you when the F shaft was first started? A. Yes, it did.

Q. Why didn't you do it? A. What?

Q. Why didn't you do it? A. I didn't think at that time. They wouldn't make that thing shorter; they wouldn't do it.

Q. You had nothing to do with that? A. I had nothing to do with that.

Q. With the design of the shaft or motor? A. That is correct.

The Master: You also said you could make one of the bearings shorter, or you could shorten the cam that was providing the trouble?

A. Yes. They may be able to take it off the cam here.

The Master: Do you have enough knowledge of the operation of an automobile engine to know whether that was a practical method, or were you simply saying from the machine standpoint?

A. I think I have enough knowledge of it that I think it would be practical.

The Master: Wouldn't it make difficulties in the operation **(2189)** of the engine?

A. It would decrease the surface of that, you know, it would decrease the life of the shaft; but, that is just a matter of opinion and study; it is just my opinion it could be done. Others might disagree with that. It was evidently the opinion of them, because they wouldn't do it.

The Master: Did you actually ask the engineering designing department—

A. (Interrupting): I can't recollect if I actually did or not. I think we might have talked about it. We did not very much at that time at Ford Motor Company interfere with that, you know.

The Master: You didn't go on—

A. (Interrupting): I will make this statement. I am not saying I did think of doing it that way.

The Master: You don't know whether you were given to understand at the time then or not that the engineering department would not cut off part of the center bearing?

A. They may have given that ⅛ of an inch, if I had thought of it at that time, and considered using that kind of a tool.

Q. (By Mr. Michael, continuing): According to your recollection now, the idea didn't even occur to you at that time? A. To use this tool at that time? I don't think it did; no.

Q. And, if you had, you said a minute ago, as I understood you, you did not think the engineering department would have okayed any changes in the shaft anyway? A. That is it, because there is no object to that flat tool, it makes different kinds of tools, which is very objectionable from the tool handling standpoint.

(2190) Q. You mean the flat tool would have been objectionable? A. Yes.

The Master: You couldn't have used all flat tools?

A. They would have been more expensive.

The Master: Would they have lasted as well?

A. No.

The Master: Tool life?

A. No, the tool life would have been shorter. The total cost of tool life and everything, this would have been more practical.

The Master: By "this" you are referring to Exhibits 268 and 269?

A. Yes.

Re-Direct Examination by Mr. Farley.

Q. On the proposition Mr. Michael asked you just why you didn't make the tools as you suggested, and use the shapers on the model F shafts. Well, now, could you, when you take into consideration the size of the model F shaft, as compared with the model T shaft, the spacing of the

cams, and the width of the cams, could you have used the same physical machine that you used on the model T for the model F? A. No, not without changing the front castings.

Q. Front castings. You would have to modify your drive also? A. Yes.

Q. To increase the stroke? A. Yes.

Q. And, wouldn't you have had to put a longer bed on the machine to **(2191)** accommodate this shaft? A. I probably would have. I wouldn't know without looking into it. You probably would have had to put a longer bed in there. We might have been able to set the end brackets out.

Q. In so far as the model F production is concerned, it would have involved building up a new machine for model F? A. Yes, absolutely. We wouldn't have considered using this for model F production.

Re-Cross Examination by Mr. Michael.

Q. You mean the old shaper? A. As it was.

Q. Even though you made it larger, you wouldn't have considered it? A. I didn't get that.

Q. Even though it was merely a question of increasing the size and dimensions of it, you wouldn't have considered it for the F shaft? A. Well, we would have made it large enough for the F shaft, and at the same time we would have made those modifications on it.

Q. That you now speak of? A. Yes.

Q. And shown in Exhibits 268 and 269? A. Yes.

Q. But, you wouldn't have considered just enlarging the old shaper and using it as it was for the F shaft? A. No.

Mr. Farley: Will you state why you would not have **(2192)** considered taking one of the old shapers and trying—

A. (Interrupting): For one of the reasons, they used them all. We didn't have any available. We didn't have any shaper available, anyhow. They were all being used on model T production.

Q. (By Mr. Michael, continuing): I meant, even though you increased, you laid it out from an engineering

standpoint on the drawing first, and increased all the dimensions and sizes so as to accommodate the F shaft? A. Yes.

Q. You wouldn't even have considered building one of those machines for the F shaft? A. I would have put those modifications on it like this here.

Q. Like 268 and 269? A. Yes, sir.

Q. You wouldn't have considered just enlarging, building a new enlarged machine to take in that shaft? A. No. I would not have done this thing for the simple reason of tool life. This modification of the tool life only—if I had a shaper I would do it.

Q. Even, then, if you had to use an old shaper enlarged to accommodate an F shaft, you couldn't have done the job, could you, for the F shaft, without moving bearings or cams, or something? A. Not without moving the work-holding means, not without changing that.

Q. And not without giving more clearance between the bearings and the cam? A. Not without getting more clearance.

(2193) Q. And, the only way you could get that more clearance was to change the shaft? A. Change the shaft.

Q. And that all comes back to the point that merely an enlarged old shaper to accommodate an F shaft wouldn't have cut the shaft? A. It wouldn't have.

Mr. Michael: No. That is all.

The Master: Suppose you had a shaft of exactly the same shape as the model T shaft, but a larger shaft, both larger cross sectionally and also in length, but with proportions exactly the same, and you built a machine similar to the original shaper to machine the cams on that shaft—

A. (Interrupting): Yes.

The Master (Continuing): Would it take you longer to machine that shaft than it would the original Ford T shaft?

A. The machine would have been enlarged—it would have taken longer.

The Master: How would you figure the extra time, machine time it would take, to machine such a shaft?

A. The machine time is a part of it. It would have been proportional to the greater length of the shaft, of the bearing here.

The Master: Also, would the greater periphery have anything to do?

A. Not so much, because the periphery was, it was largely a factor of deflection of the shaft due to the fact the shaft was stiffer. I probably would have been able to take a heavier **(2194)** chip.

The Master: But, the time would have been increased in proportion to the greater length of the cams?

A. Yes. If the machine had not been changed in any other respect which, of course, I would have done. I would have incorporated that lighter ram.

The Master: Disregarding this question of modification in the ram, would the machine time have been increased in exact proportion to the greater length—or, rather, width of the cams?

A. No.

The Master: Your accelerating and decelerating time—

A. (Interrupting): The machining time would have been increased in that proportion.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. You are figuring on keeping the same cutting speed, is that the idea? A. Yes, keeping the same cutting speed, based on using the same cutting speed.

Mr. Farley: Would you mind reading the last question and answer of Mr. Michael and Mr. Oberhoffken?

(The Reporter (reading): "Q. And, the only way you could get that more clearance was to change the shaft? A. Change the shaft.

"Q. And, that all comes back to the point that merely an enlarged old shaper to accommodate an F shaft wouldn't have cut the shaft? A. It wouldn't have.")

(2195) Q. (By Mr. Farley, continuing): Mr. Michael there asked you the question that merely an enlarged old shaper, enlarged old model T shaper, enlarged to cut the F shaft, would not cut the shaft? A. The tractor shaft.

Q. The tractor shaft? A. Yes.

Q. Just why wouldn't it have cut the tractor shaft? A. Because there wouldn't have been enough clearance to get the tool in there.

Q. Oh, I see. That is what you have in mind? A. Yes.

Q. That involved some change in the bearings? A. Yes.

* * * * *

(2196) HENNING OHRN was thereupon called as a witness on behalf of the Defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. Your name, please? A. Henning Ohrn.

Q. Where do you live, Mr. Ohrn? A. 5948 South Campbell Avenue.

Q. And, what is your occupation? A. General Foreman.

Q. By whom are you employed? A. International Harvester Company, the tractor works.

Q. How long have you worked for International Harvester? A. 28 years.

Q. In connection with your duties at International Harvester, did you ever have anything to do with the cam shaft department? A. Yes. In 1919 to 1922 I was in charge of that department as a foreman.

Q. How was the International Harvester Company machining the cams **(2197)** of the cam shafts when you went into the department as foreman? A. Well, I was there when they started. We first rough grind the cam shaft on a Norton grinder, and then we finish grind them, second operation, on a Norton grinder.

Q. Did you at that time endeavor or attempt to change over from rough-grinding to any other type of machine? A. We never did up to the time that this Gordon machine came in. I didn't have any—we didn't make

any attempt to do anything else than rough and finish grind the cam up to the time the Gordon machine came in.

Q. When did the Gordon machine come in? A. That was in early 1920.

Q. I asked you to see, to produce certain records of the company that had to do with that Gordon machine. Did you succeed in getting those? A. Yes, I went yesterday and got those records (producing documents).

* * * * *

(The two documents above-referred to were thereupon marked Defendant's Exhibits 306 and 307, respectively, by the reporter.)

(2198) Mr. Farley: The installation card will be 308.

(The document above-referred to was thereupon marked Defendant's Exhibit 308.)

Mr. Farley: And, the disposition card, 309.

(The document above-referred to was thereupon marked Defendant's Exhibit 309 by the reporter.)

Q. (By Mr. Farley, continuing): Now, you have produced a requisition or number of papers. I would like to ask, first, are these records regular records of the International Harvester Company? A. Yes, sir.

Q. And, you got these from the files of the International Harvester Company yesterday? A. Yes, sir.

Mr. Farley: I offer in evidence Defendant's Exhibit 306, which is a requisition for one Gordon cam turning machine, dated November 20, 1919. (Presenting document to the Master.)

As Defendant's Exhibit 307, a letter constituting an order for a Gordon cam turning machine, which is dated November 24, 1919. (Presenting document to the Master.)

As Defendant's Exhibit 308, a record card of the International Harvester Company entitled "Installation of Machinery," which has the name and description of machine made by Charles Gordon, Inc., and purchased from Charles Gordon, Inc., date installed, April, 1920. (Presenting document to the Master.)

And, as Defendant's Exhibit 309, another card of the International Harvester Company entitled "Dis-

position of Machinery," which has a date stamped August 11, 1927, and up at the top a date which is not very legible. It looks like 8/30 or 6/30, **(2199)** 1927 (handing documents to the Court).

Mr. Michael: I think you referred to this purchase order as 308 just now. There seems to be some confusion over what you had identified the exhibits as.

Will you read the offer of those exhibits, please?

(The offer of the exhibits by Mr. Farley was thereupon read by the reporter.)

Mr. Michael: All right. I object to the materiality.

The Master: You don't object to the identification of them as a record?

Mr. Michael: No.

The Master: I think I will reserve a ruling on the objection, and you can go ahead and examine on them as though they were admitted in evidence.

Q. (By Mr. Farley, continuing): Now, this machine, this Gordon machine, which the records of the company show was received in April, 1920, did you have anything to do with that machine, Mr. Ohrn? A. Yes. I was in charge of that department. At that time I hadn't been foreman very long. I just came up as a set-up man, supervisor, and I started the machine off. That is the first thing I always did, because I wanted to be acquainted with the machines as they came in new. I started the machine up, and I remember very well one thing what happened, and that was the circular tool broke on the cam, on the nose of the cam.

I reported this to Mr. Lander, Mr. Charlie Lander, and he came up and looked at it, and we took out the cap screw that held the tool, and we had several tools on hand which **(2200)** were with the machine, and put in another one, and we made a shaft or two.

I can't remember all the details exactly there, but we were not successful on making a good shaft. The tool bothered quite a bit, so Mr. Lander told me to put a man on there, a good mechanic on there, and see if he couldn't work that out.

So, Mr. Kipta, who is out in the other room—Mr. Lander is a master mechanic, and we worked together, of

course, both the assistant foreman, Mr. Kipta, and myself, trying to make this machine go, but we were not successful.

So, I had to report to Mr. Lander again about the difficulty we had, and he told me, "Well, I will call in an expert on the job."

So then, we went off the machine probably, I can't remember, but it was probably a week when one of their men came in. This man's name, I don't remember his name; we have had so many experts in there, and he tried to make it work. Well, he succeeded to get the tools to stand up so they wouldn't break off, but we had the trouble that when the cam comes down to the tool, it made a hollow, and as it turned over, we made a lump.

Q. That is, it made a hollow on the side of the cam as the side of the cam was approaching— A. (Interposing): That is right.

Q. (Continuing): —the tool? A. The tool.

Q. The nose was approaching the tool? A. Yes.

(2201) Q. And, made a hump on the far side? A. Yes.

Q. You said one of the men came in, an expert, was that somebody from the Gordon Company, or representing Gordon? A. Yes.

Q. How long did you work with this Gordon machine in attempting to use it in the International Harvester plant? A. Well, off and on, we were on there trying to make it work for about three months. I wouldn't say, I wouldn't be sure that that was three months on the date, but pretty close to three months.

Q. And, what success did you have? A. Well, we were not successful. This Mr. Charlie Lander is an exceptionally good mechanic, and he bought the machine, and if he could have made it work, I tell you, he would have absolutely. He had rebuilt so many machines over there that didn't work, and this is the only one he failed on.

Q. Could you state whether or not in the three months you had the machine you succeeded in turning any satisfactory or usable cam shafts? A. Not so that we could send them to our hardening department and take them back. They were too heavy. We would have ground off all the hardening, all the carbonizing and hardening, and that was a soft spot there. So, we didn't even try that.

We did try, however, to make the machine pay for itself, or work, by taking a rough cut on this machine, and then grind it on the Norton grinder, finish it up, but it wasn't successful **(2202)** for the reason that the two prices, we had piecework prices, the two prices became higher than the one to rough grind, because we had to handle the shaft twice.

Q. That is, the cost of the rough grinding, and the Gordon machine, the way you attempted to use it, was even more expensive than doing the whole job on the grinder, is that the idea? A. Yes, sir.

Q. Now, you say you worked for about three months with the Gordon machine. What did you do with the machine after three months were up? A. Well, Mr. Lander had it on the side. He moved it out of our department. He had it in the department, and if he intended—if he made an attempt to make it work by changing anything, I don't know. It was moved out of my department and stored in what we call the No. 1 warehouse.

Q. After you moved the Gordon machine out into the No. 1 warehouse, did you still continue to be in charge of the cam shaft department? A. Yes, for about two years.

Q. What did you then use after you moved the Gordon machine out into the warehouse? A. We went back to the old grinder; rough grinding, and finish grinding.

The Master: Are you still using the rough grinding method for machining cams?

A. No, not now.

Q. (By Mr. Farley, continuing): What method are you now using? A. We have two machines up there; two cam turning machines.

(2203) Q. What type of machines are they? A. Melling.

Q. How long have you had those machines? A. I wouldn't answer that. I couldn't be fair there, because I wasn't in charge of it when they came in, so I don't remember. I haven't looked up the record on that.

Q. You were not in charge when the Walcott machines came in? A. No. Mr. Hajovich was in charge.

Q. Now, I asked you to produce drawings of the International Harvester Company that would show the construc-

tion or type of cam shaft that was in use at the time, used by International Harvester at the time the Gordon machine was purchased. A. Yes. I was in the engineering department, and got the two tracings. This one here (indicating) was never used on the Gordon machine; only this one here. We only had one. This came in later on, and the Gordon machine was out then.

Mr. Farley: I will have this marked Exhibit 310.

(The document above-referred to was thereupon marked Defendant's Exhibit 310 by the reporter.)

Mr. Farley: And, we will mark the second blue-print, Exhibit 311.

(The document above-referred to was thereupon marked Defendant's Exhibit 311 by the reporter.)

The Witness: You asked for one more tracing, but that is out at Fort Wayne, but you have the same cam enlarged there as you asked for this tracing here. That is out in Fort Wayne.

Q. (By Mr. Farley, continuing): Now, you have produced two **(2204)** original tracings from which tracings these blue-prints, 310 and 311, were made? That is, these are blue-prints of the tracings? A. Yes.

Q. And, Exhibit 310 is a blue-print of the shaft that the International Harvester was then manufacturing, on which you attempted to use the Gordon machine? A. Yes, sir.

Q. This blue-print, Exhibit 310, does not contain any detail showing of the contour of the cam? A. Right in here (indicating).

Mr. Farley: Well, the witness pointed to a set of views on the upper part.

Q. (By Mr. Farley, continuing): The drawing, Exhibit 311, does contain down in the lower right-hand, or left-hand corner, an enlarged showing of the cam contour? A. Yes.

The Master: This Exhibit 310, you have two different styles of contour of the cam and shaft; four of them are much more blunt on the lift than the other four (indicating).

A. Some of them are. This cam is exactly the same there (indicating). This is exactly the same.

Q. (By Mr. Farley, continuing): You mean the cams on the two prints are exactly the same? A. Yes. This one here—it is the same also; 22 degrees.

Q. The exhaust cams have a blunter or more rounded nose than the intake cams? A. That is right. The only difference in this shaft is, this is cut off here (indicating); not used any more.

(2205) Q. The only difference between the shafts shown in Exhibits 310 and 311 is that in the shaft shown in Exhibit 310 there was a reduced part with a threaded end on the left hand— A. (Interrupting): I wouldn't say that is the only thing. I haven't checked them. But, as far as the cam is concerned, they are all the same.

Q. As far as the cam contour is concerned, they are all the same? A. Yes.

Q. Now, the showing, the enlarged showing of the cam contours, which is entitled, "Cam outline enlarged four times," shows on the right-hand side of the view the contour for the intake cam and on the left-hand side the contour for the exhaust cam? A. That is right.

Mr. Farley: I will offer the blue-prints as Defendant's Exhibits 310 and 311.

Mr. Michael: Same objection; they are not material.

The Master: Subject to that objection, on which I will reserve a ruling, I will admit these exhibits.

Q. (By Mr. Farley, continuing): Now, were you interested in the International Harvester plant in making or trying to make this Gordon machine work? A. Oh, yes, certainly.

Q. And, as I understand it, there was a substantial investment there; the machine, according to your records, cost the International Harvester Company some $5500. I don't remember what the exact figure is. (Examining document.)

The total cost of the machine to your company was $5444.33, as **(2206)** shown by these records? A. That is right.

Q. Who, besides yourself and Mr. Lander, did you have working on that machine trying to put it in satis-

factory operation? A. Mr. Kipta and Mr. Charlie Hajovich.

Mr. Farley: I think that is all. You may examine.

The Master: Did you have any different experience in turning two different styles of cam, the exhaust cam and the intake cam?

A. The intake cam is the hardest to turn. This pump eccentric would be very easy to turn; you would have no difficulty with the pump eccentric. Even the pump, Gordon would turn that. But, the intake cam, that would be impossible, and we had trouble here, too.

Mr. Farley: "Trouble here, too," you mean with the exhaust cams?

A. Yes. It left too big a hole here to allow us to use the machine. We would have to grind off too much to come down to the surface, and too big of a lump, and so if you send it down and carbonized it, then we ground off all the carbonizing, and then you would have a soft spot.

Mr. Farley: And, if you had a soft spot in your cam shaft, would that be a usable shaft?

A. No. It would not pass, pass our inspection.

Mr. Farley: All right. You may examine.

(2207) Cross Examination by Mr. Michael.

Q. Did you have anything to do with the purchase of this Gordon machine? A. No, that is altogether up to Mr. Lander.

Q. Did you see a Gordon machine working in any other plant before it went—before you bought the one for your plant? A. No, sir.

Q. Did you see a Gordon machine in any other plant at any other time? A. No, sir.

Q. Do you remember any trouble in the turning of the pump eccentric on this Gordon machine? A. No.

Q. You had no trouble at all? A. No.

Q. It turned that right from the beginning? A. That turned.

Q. That is your recollection of it? A. Yes.

Q. Do you remember having any trouble with the timing of the cams after they were cut on the Gordon

machine? A. No, I can't say we have any trouble there, because we ground them afterwards, and when we checked the cam, it is always corrected then to the key-way in the grinding.

Q. But, if the timing was off in the Gordon machine, your grinding wouldn't help you very much? A. We had to leave some stock on. It was determined it was just as well to grind them from rough, because we had to leave so **(2208)** much stock there. We tried to make the Gordon machine pay for itself. Mr. Lander was very anxious that it should work. So, if it would have paid for itself by taking the rough cut, and then just taking the finishing cut on the Norton grinder, we would have used the three machines, rather than the two. So, if it is off, we didn't check that. We don't check them before they are finish ground, because they always twist a little in hardening. I couldn't tell you if it was off or not.

Q. You don't remember any trouble in that connection? A. No, we wouldn't have any trouble, because we left so much stock for the few shafts. We probably made about 200 good shafts at that time that we were able to grind. The rest of them we, probably, had 75 or 80 scrapped because the tools broke off; like I told you to start with, they often broke off the tool, and then took off the nose of the cam.

Q. What was that due to, a spring breaking, or something of that kind? A. It seemed like the ratchet in back of the tool was not deep enough, so when the cam came over there with the nose, it was too powerful, the cam moved the tool, and that moved it from the sharp point, and turning into the roundness of the tool, it just broke off the set screw that held the disc on.

Q. You say the ratchet was not strong enough? A. Well, we probably could have overcome that by using deep ratchets. It would have been a better hold there.

Q. Did you try to overcome it that way? A. I can't remember if that was tried or not. The principle of the machine would never work, even if you would have been able **(2209)** to overcome this, this difficulty of holding the tool. That Mr. Lander would easily have been able to overcome.

Q. But, as far as you know he never tried to? A. Of course, we didn't like to scrap the shafts. We were

trying, naturally, different bolts or cap screws to hold the tool. They were hardened. We were trying to get them tougher, rather than to get them hard. First one broke. We tried to make a set screw that would hold. Then, we had, if I remember right, about a dozen tools—it probably shows in the record; I didn't look that up—I remember some quite a few tools came in with the machine, and we would have been able to make new tools, and the hole larger, and the cap screw larger, and we would have been able to overcome that; but, the outline of the cam on the nose, on both sides of the nose, that we would never have been able to overcome, except the machine was rebuilt and changed. I couldn't go into that detail because I don't know enough about the action there to tell you. I have my own opinion, but that would be just a workman's opinion.

Q. You mean you did not know enough about the action of the machine, or the way it is operated, to suggest how to change it? A. Well, I personally have my opinion about it, if you care to hear that I can tell it to you, but that wouldn't mean much.

Q. Did you work on the machine yourself? A. Yes, sir.

Q. Did you attempt to make any changes in it, or make any suggestions? A. No, we are not allowed to make any changes. We are allowed to **(2210)** suggest any changes we make.

Q. How many men did the Gordon Company send in? A. Two; they were in twice.

Q. How long did he work on it? A. I would say the first time he was in a week, about; it might be four or five days.

Q. At the end of that week didn't he turn some pretty good shafts on the machine? A. He turned shafts that we were able to grind, but not that we were able to send down to harden.

Q. Did you try to do that, turn some close enough so that you could send them to harden? A. Yes. We tried to take two cuts on the Gordon machine, but it was the same result.

Q. Did you ever operate the machine to take two cuts? A. Yes.

Q. How did you do that? A. We just took them out and started over again, just like you would turn two cams.

Q. You only had one machine? A. Yes.

Q. You put a shaft in and cut across the cams? A. A. Yes.

Q. And then took the shaft out and put it in again? A. We made 5 or 6 shafts, and then we set them in again and took another cut.

The Master: Without any readjustment of the tool?

A. Oh, yes, we had to move up the tool, then.

Mr. Farley: Readjust the tool for the second cut.

(2211) A. Yes.

Q. (By Mr. Michael, continuing): Tell me how you did that with the Gordon machine. A. I couldn't remember just what we did, but we attempted it.

Q. You attempted it? A. Yes.

Q. Did you do it? A. I think we did.

Q. How could you adjust the tools on the Gordon machine to take a second cut? Are you familiar with the machine? A. Yes, I am. That is, I was at that time. It is 20—it is quite a long time ago.

Q. You are sure you cut once across the shaft, and took the shaft out, and then you adjusted the tools and put it back, and took another cut. You are sure you did that? A. Yes. As well as I can remember. Yes.

Q. But, you don't know how you did that? You don't know how you adjusted the tools? A. I can't remember that; no.

Q. How much of a cut did you take the second time? A. We attempted to take enough to make a very light load on this tool here. This shaft here is quite springy, and you will find, if you turn that twice, even adjusting it, without adjusting it you will find you take another cut anyway on it. If you have a Gordon machine anywhere in the country, if you take this shaft—

Mr. Farley (Interposing): Referring to Exhibit 310.

A. (Continuing): —if you take a shaft here, there is enough (2212) spring on the Gordon machine on their arms

there,—you take one cut over, you will find how to take another cut there, your tool will cut.

The Master: You mean without a readjustment?

A. Yes.

Q. (By Mr. Michael, continuing): Is that what you mean, or did you mean you adjusted the tools? A. I can't remember what we did there, but you will find that is the truth. It is true even with the machine we have today.

Q. There would be some spring in the shaft, too, wouldn't there? A. Yes.

Q. So that in any turning operation on a job of this kind, if you took another cut without any readjustment, you would take off some metal? A. On some, yes, that is true.

Q. Did you work at all with the Gordon men when they came in to make the machine work? A. Yes, we were around him, sure. We had toolmakers up there, and whatever he asked for we did. The second time he was in, I remember the rollers in back of the machine there that were operating on the cam, there were three or four of them, there was also a flat spot on, and we had to stop them for a few days in order to get new rollers in.

Q. What would occasion a flat spot on a roller? A. That seemed to be the hammering action of the spring and the cam. It seemed like when the cam came to the nose where it was going to pull out the tool, and then came in again, it was a sharp hollow in the cam, and that jumped over there.

It didn't seem like it followed that quick enough, and it **(2213)** jumped over, and that is what we thought made a lump there, and I imagine it just jumped there all the time.

That machine was just like an air hammer, and, of course, we thought probably those rollers were a little too soft. So we waited until we got new rollers, and then we put them in, but we had the same trouble on the nose of the cam. That was always our trouble.

Q. Don't you think that was due, to some extent, to weak springs? A. No, my opinion is that it was due to the tipping of the tool there. You have that action right in front there, and also, if I remember right, the cam coming this way, that pulls out the tool. It is probably much sharper here.

When the rollers came here (indicating) it was going to pull out the tool from the nose of the cam, pull it away from here, and then when it went over there it didn't have time to follow that; it just jumped from here to here, from the nose to here (indicating).

Q. Which way are you drawing there, the cam that controlled the in and out of the tool? A. No.

Q. The tilting movement.

The Master: Perhaps you better make this clear on the record. The figure you have drawn over in the right here is the cam being cut?

A. That is right.

The Master: Suppose you mark that "C," and this cam here is the one that controls the oscillating movement of the tool?

A. That tilts the tool, yes.

The Master: Call that "M."

(2214) A. It is an arm coming up. This was a little higher. The arm come up here with the roller on, and it was, where the tool was in here, it had a ratchet on here, and another ratchet here, and this arm coming over here with the roller.

Mr. Michael: Instead of referring to that sketch, why didn't you look at this enlarged print of the tool unit marked before Judge Tuttle as Exhibit 47-A?

Mr. Farley: I wonder there if I might have a question. Do you recognize the machine shown in those drawings, which are marked Exhibit 47-A?

A. Yes. I recognize that.

Mr. Farley: As what?

A. This is the arm—

Mr. Farley (Interposing): I am talking about that as the Gordon machine.

A. Gordon machine.

Mr. Farley: All right, go ahead.

Mr. Michael: Now, which cam are you referring to?

A. This large cam here.

Mr. Michael: 44.

A. This one here.

Mr. Farley: That is No. 44?

Mr. Michael: Yes.

Mr. Farley: Now, Mr. Ohrn, please, as we are talking here, as you go on you will notice all these parts are numbered.

A. Yes.

Mr. Farley: So, you can just refer to the numbers.

A. All right. I was talking about the cam 44.

(2215) Mr. Michael: Now, what is your idea of what was wrong?

A. When this cam came down—the roller came just about here.

The Master: You are referring to about a half-inch from the point?

A. This roller 53 came just about up to here (indicating). This cam 18.

The Master: Up to here, you mean up close to the highest point on the master cam?

A. This way, just about to the highest point. This tool 37, and the cam 18, would be about here (indicating).

The Master: You mean just—

Mr. Michael (Interposing): Nearest the highest point on the work piece 18.

A. Yes. And now, anyone familiar with the turning tool knows if you tried to pull away that tool you have a little difficulty; so, naturally, that tool, having only a spring, trying to hold it back—

Mr. Michael (Interposing): What spring holds it back?

Mr. Farley: Which spring operates this carriage?

A. This one here, 47.

Mr. Farley: That is a screw, isn't it?

Mr. Michael: Just let the witness go ahead.

The Master: Let him continue.

A. This might be the spring here, 50. That holds the—that operates this arm here.

Mr. Farley: That is the arm 23?

A. That is right.

Mr. Michael: Well, then, this cam 44 you have been talking **(2216)** about has nothing to do with moving the tool in and out, did it?

A. Yes. When this cam here turns down here in this direction of the arrow, then this here lifts up this arm here.

Mr. Farley: The arm 52?

A. 52, that is right. And that, when that gear pulls down that lifts up the tool.

Mr. Michael: That does what?

A. That tilts the tool this way.

Mr. Michael: Yes.

A. And, when this tool comes up to here, or the cam comes down to the tool point, they meet there, and that is where we have the hollow spot. Then, the quick action of this roller here—

Mr. Farley: Roller 53.

A. Roller 53 has to follow this.

Mr. Michael: Up over the high point of the cam 44?

A. Yes, to get in here (indicating) on the cam 18.

Mr. Farley: Get into the nose of the cam.

A. On this side of the nose. Then, we had a lump. And, I always figured it didn't have time; what it should have, if this roller would have had another groove here, so that it couldn't have gone away, but had to follow it, something might have broken, but it had to do it. This is pretty quick acting, and I always figured it wasn't fast enough. This action was too fast for the rollers. It just jumped over to here, and left a lump here. That is my idea of it.

Q. (By Mr. Michael, continuing): Well, now, let us follow that a little farther. In order to make a hollow in the side of the cam you are cutting, wouldn't it be necessary that the tool **(2217)** move inwardly? A. No, not necessarily.

Q. Doesn't the point of the tool define the contour that you are cutting? A. That is correct, but if you had ever so little spring in on these places here, if you have ever so little play there, you will always find that will have a hard time to pull out.

Mr. Farley: The tool.

A. The tool would have a hard time to pull out, 37, and it will be natural to want to follow this radius.

Mr. Farley: You mean the circular—the witness is indicating the circle to indicate the base circle of the cam.

Q. (By Mr. Michael, continuing): What in this machine prevents the tool from following the base circle? A. Any little play in all these joints and any little play in this gear, which you will find you have in every machine, that is only my idea now. Somebody else might have another one. I know that we had a hollow spot there, and we had a lump there. That is all I know about it.

Q. But, is it your view that the thing that occasioned that was this roller 53 on the cam 44? A. Yes, because of the fact you would have to pull away from there.

Q. What do you mean "pull away"? A. Pull away from the cut. This always had to tilt there, and you had to go away from this circle here and go straight.

Q. But, the cam 44 had nothing to do with the going away from the circle, did it? A. Well, I don't know. It had the action of tilting of the tool.

Q. But not any movement towards and from the axis of the work, **(2218)** did it? Or, so you understand, that the cam 44 did both tilt the tool and move it back and forth? A. No, sir; absolutely no. This here only tilted the tool. This here.

Q. On what point did the tool tilt? A. The tool was fastened here with a little set screw right there, or cap screw.

Q. Did the tool tilt on that point, the point where you put your pencil? A. No. I am trying to find where it did, but I can't see it here where this slides just like in a little—

Q. (Interposing): Segment? A. Yes.

Q. Groove? A. Yes.

Mr. Farley: Track.

A. Whatever you want to call it.

Mr. Farley: You mean this here, you are pointing to the tool-holder 34?

A. Yes.

Mr. Farley: Sliding in a track.

A. Sliding in a track, yes.

Mr. Farley: Or guideway?

A. Now, then, you have the same condition here as before. You will find the natural way of the tool there and the cam shaft is to turn it around. It isn't natural to go in and out, so whenever it comes here the springing of the shaft naturally would have a tendency of holding it stiff to start with, but finally it had to give a little.

(2219) Q. (By Mr. Michael, continuing): The shaft would? A. The shaft would, and any play you would have in all these different places would have the same thing.

Q. In the machine you have out there, did any of these springs break? A. Not that I remember. We had most of the trouble with the tool. This little cap screw broke off, and sometimes the ratchet in back there seemed like it wasn't strong enough, so sometimes that turned, and this part turned around, and it acted just like two rollers would, and that took off—the width of the tool, if I remember right, was about 3/8, and that took off the whole nose of the cam.

Q. You weren't able to turn any shafts which were worth saving on this machine, is that right? A. They were salvaged. About 200, I would say, would be salvaged. Maybe 60 or 70 were scrapped altogether.

The Master: Were those 200 that were salvaged, were they salvaged before or after you started to take a thin cut with a rough-grinding operation afterwards?

A. They were salvaged on the Norton grinder just like you would do. We tried to grind after we have turned it.

The Master: Did you get any successful shafts? Were you able to salvage any shafts before you started trying to use the machine in conjunction with a rough-grinding operation?

A. No.

Q. (By Mr. Michael): Did you ever put the machine in production, or attempt to? A. No. We never put a piecework price on the job. First we, what **(2220)** we call, take out the bugs of any machine, and when it operated 2 or 3 days satisfactorily, then we call the time study and take a time study on that job, and the man receives a piecework price. Up to that time he is paid a day rate.

Q. How long after the machine first came in did you decide you couldn't do anything? Did that develop the first day? A. The first day like I said—first, of course, we oil up the machine and look it over to see if everything is O. K. in shipping. Then, if we think everything is O. K., we start up the machine and let it operate for about, oh, 20 minutes, or an hour. It all depends on what type of machine it is. If it is a drill press, we don't do that, but if it is a complicated machine, we let it go up and down—

Q. (Interposing): Just limit your remarks to what you did with this Gordon machine. A. That is exactly what we do with the Gordon machine, like we did with the others.

Q. You oiled it up, and ran it for a half-hour or so, and then put in a shaft? A. Let it repeat its cycle several times so we see it operates, so that if something happened in shipping it wouldn't make trouble for us. Then we stick in a piece in the machine and start it. The first piece, one of the tools, the set screw, or one of the tools, broke.

Q. Then, what did you do? A. Then, I reported to Mr. Lander whatever happened. We were told to report to the master mechanic. He come up and took **(2221)** a look at it.

Q. And put in another tool? A. Yes.

Q. And started up again, and then what? A. That was—I can't remember if it happened again. We had quite a bit of tool trouble, but we had this trouble with the cam, that it didn't turn what we wanted it to turn. So, Mr.

Lander walked away and says you better put on some very good men there and see what he could do.

Q. That was the day the machine came in? A. I wouldn't say it was the day it came in. It probably was up there 2 or 3 days before it was set up. The millwright sets up the machine, and when they are through with it, we get it. I couldn't say if it was a day or two days, or if it was a week after.

Q. But, anyway, Mr. Lander said to call in somebody and get to working on it? A. He said, "You put on someone to see what he can do, and I will call in one of the experts on the machine." He come in pretty quick.

Q. Who, the Gordon man? A. The Gordon man, yes.

Q. What did he do? A. Well, he started to work on it just like we had done.

Q. Do you know what he did to it? A. Well, he couldn't do very much. He didn't have anything to do. He had the same difficulty, talking about the springing of the shaft. He talked about the sharpness of the nose of the cam.

Q. He wouldn't spend a week doing that, would he? **(2222)** A. No, but when he wasn't able to produce something, of course, he was there trying.

Q. Would he just stand there a week talking about it? A. No, he worked there.

Q. What did he do? A. Well, trying to turn the shaft.

Q. He just tried to turn the shaft without doing anything to the machine? A. We had this difficulty with the tools, you see.

Q. What did he do about that? A. Well, tried to overcome it. We made new set screws. I couldn't remember if we ground them to ratchets any deeper or not. We had tool-makers with him, one tool-maker with him. I tried to get this John Lundquist, he was with him. I asked him if he remembered anything about it, but he said no, but he worked hundreds of machines, and so many more after, I couldn't blame him.

Q. After the Gordon man was there a week, I think you said he got the machine to turn a rough shaft that you were able to grind and sent to hardening. How long did you use the machine that way? A. We kept on working on the machine off and on, and we had difficulty with the machine, and I can't remember now if it was one week,

or two weeks after that we had to call the Gordon man in again, and then he didn't stay very long, because he took a few of those rollers back, if I remember right, it was four, and he said he would send new rollers in.

Q. Did he do that? **(2223)** A. Yes, he did that.

Q. Then, you operated the machine again? A. Then, we tried to get it again, yes.

Q. How long did you try? A. I say we were off and on that machine for about 3 months.

Q. And then you quit altogether? A. Yes.

Q. Gave it up as a bad job? A. Then, Mr. Lander said he would take it off the floor, and see what he could do with it. What he did, I don't know.

Q. Did you pay for the machine? A. I don't know.

Mr. Farley: I think the books of the Gordon Company show the machine was paid for.

Mr. Michael: Well, I don't know what the books show. I haven't looked at them. It seems odd, though, that they would pay for a machine that performed in this way.

Mr. Farley: They weren't as smart as Ford.

Q. (By Mr. Michael, continuing): Who purchased the machine? On whose authority was the machine purchased? A. City Office.

Q. City Office? A. Yes.

Q. Did Mr. Lander have anything to do with it? A. Mr. Lander always goes out and looks over the machinery. He is not with us any more. He is retired. But, he for many years there was the man that was always consulted if a machine was going to be bought, but the last word is down at the City Office.

(2224) Q. Do you know whether Mr. Lander went out and saw the Gordon machine before he saw this one? A. I couldn't say that, but most likely he did.

Q. Where is Mr. Lander now? A. He lives in Berwyn, but he is retired, and he is down in Florida and up in Wisconsin fishing; he is having a good time now.

Q. Where does he live? A. Berwyn.

Mr. Farley: You don't know where Mr. Lander is now?

A. No.

Q. (By Mr. Michael, continuing): Berwyn, you mean a suburb of Chicago? A. Yes.

Q. B-e-r-w-y-n? A. Yes.

Mr. Farley: I think you have Mr. Lander's address in that proposed stipulation, 6939 West 30th Street.

The Witness: That man is the best mechanic I have ever met. He would be able to be an authority on what trouble, what caused our trouble.

Q. (By Mr. Michael, continuing): After you laid the Gordon machine aside, you went back to rough grinding? A. Yes, sir.

Q. How long did you continue that? A. As long as I was in the department.

Q. You left the department in 1922, is that right? A. Yes. I was transferred to department 9 in 1922.

Q. And, they were still grinding when you left? (2225) A. Yes, sir.

Q. But, you don't know what happened after you left? A. Oh, yes. I know Mr. Charlie Hajovich was the foreman after that. He is in the next room. He can tell you all about what happened after that. It would only be what I have heard from Charlie, anyway.

Q. Do you have any knowledge as to how many machines the Gordon Company had built and sold at the time you purchased this machine? A. No, sir, I was told by the man, I remember now, that they had the machine that had turned shafts, but the cam was not as pointed as ours. He told me that. I remember that now.

Q. He told you they had one machine— A. (Interrupting): No, he said they had a machine. I don't know if he said one or two. But, he said they had a machine that—"You have a pretty pointed nose there on the cam," he said, "We haven't had that experience," he said.

Mr. Michael: That is all.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. When the man from the Gordon place came in the first time, and was there about a week, you didn't make it a practice to walk right behind him all day long each day that he was there, did you? A. No. I had two floors in the

six story building, and I naturally, as foreman, I had about —I wouldn't say now how many men there were there at the time, but there were quite a number of (2226) men, and naturally I had to take care of all of them.

Our practice is, when an expert comes in, to give this man a toolmaker and repairman to take care of anything that he might want to have taken care of. That is, if he asks for it. If he don't ask for it, we don't do it.

Mr. Farley: I haven't any more questions.

The Master: That is all, then.

(The witness was thereupon excused.)

CHARLES HAJOVICH was thereupon called as a witness on behalf of the Defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. Your name, please? A. Charles Hajovich.

Q. Where do you live, Mr. Hajovich? A. 2124 North Nordica Avenue.

Q. And, you are employed by International Harvester Company? A. Yes, at the tractor works.

Q. And, what is your job at International Harvester? A. I am a foreman.

Q. How long have you worked for International? A. 24 years.

Q. What department are you foreman of now? A. Department 30.

Q. What do you manufacture in department 30? A. We sell grinder parts; cam shaft is one, miscellaneous parts.

Q. How long have you been in that department? (2227) A. I am in that department since 1918; probably 21 years.

Q. Now, what experience, if any, did you have in the International Harvester Company when the company purchased a Gordon machine for turning cam shafts? A. Well, I was the assistant foreman in department 30.

Q. Do you remember the machine? A. Yes, sir.

Mr. Farley: I wonder if you would let me have those large drawings to use?

Mr. Michael: Yes, sir. (Handing documents to Mr. Farley.)

Q. (By Mr. Farley, continuing): I show you an enlarged drawing, which was marked Exhibit 47-A here, and ask you if you recognize that (handing document to witness)? A. Yes, sir. This is a Gordon machine, Gordon cam turning lathe; part of it, as I see it.

Q. Will you please just tell what you remember about the experiences you had with that lathe? A. Well, the machine was installed in department 30, that was early in 1920. And, we started to operate that machine, and we couldn't get it to work that would be right. In other words, cams were coming out out of shape; on one side it would dig in, and on the other side it would leave a high spot, so it was necessary to leave too much stock on the cam to clean up in the grinder, and the result was the cam was no good. So, it was necessary to re-work that cam, if you wanted to use it.

In other words, any shaft we made, it couldn't pass as it was; it had to be re-worked. So, we had trouble with it, and then when we found we couldn't use the shaft, we stopped.

(2228) Then, of course, my foreman was notified, and he, in turn, reported to Mr. Lander, who was mechanical superintendent, and the man who purchased that machine, as I know.

Then, the man came in from—well, evidently he was sent by Gordon, and he tried it. He couldn't make it any better than we could. He tried, and spent quite a little time on it. We ran the machine on and off, and then we gave it up.

So, when this man came in last time he spent about two weeks on it. Then, he left. After he left we didn't run that machine any more, because we couldn't.

He couldn't make it go himself. And, during that time we continued grinding where we were grinding the cams on the Norton machine, and then we kept grinding those shafts afterwards, because that machine was abandoned afterwards. We couldn't operate it on account of that it didn't turn out good work.

Q. Did you ever attempt to operate the Gordon machine taking more than one cut across the work? A. It was tried, but it didn't help. It was still out of shape.

Q. For how long a time was it—I don't remember that you said that you tried to make this Gordon machine work? A. Well, we had the machine for about 3 months, and we tried on and off. We didn't run the machine continuously. Whenever something was—we tried everything. In other words, we tried to make it work and finally abandoned it. We couldn't make it go. The machine was tried for about 3 months, and then we let it stay.

Q. After you abandoned the Gordon machine what, then, did you use to machine your cams? (2229) A. Well, we continued grinding our cams from forgings on the Norton grinder.

Q. How long did you do that after you abandoned the Gordon machine? A. Well, we run that for 6 years after that.

Q. What next did you do? A. We got a new machine called a Melling cam turning lathe, made by the Walcott people.

Q. What are you using now for machining your cams? A. The Walcott. The Melling cam turning lathe is the name.

Q. In this Melling lathe you have now, do you tilt the tool to keep the angle of the tool constant? A. No, sir.

Mr. Spohn: Will you repeat that, please?

(Last question and answer read by the reporter.)

Q. (By Mr. Farley, continuing): How does the tool move in the Melling lathes which you have now? A. The cam that we have in the machine is one of the cams we are making, is used as a master. That cam is moving the tool back and forth. In other words, the cam is used as a master, which moves the tool-holder back and forth to follow the shape of the cam, and then there is another cam that operates the tool straight up and down, so that the tool works up and down, and back and forth, operated by one of our shafts, which is in the machine used as a master; and, the cam that is being turned is exactly the same as the one that we use for the master.

Q. Did you get any shafts during the three months that you had the Gordon machine from the Gordon machine which you were able (2230) to perform the ordinary finish grinding operation on and use it as a usable part? A. We

didn't use any of them that way. There were some, and some were scrapped.

Q. When you re-worked them, just what did you do? A. We put them in a grinder, and line them with the master, and they grind so that the cam gets in the right shape.

Q. Then that, in effect, was a rough-grinding? A. A rough-grinding before hardening, allowing 25 to 30 thousandths; that was our practice always to leave for the finish grind after hardening.

Q. Was the operation on the Gordon machine, the first turning and the rough-grinding, or re-working, as you just said, how did that compare, the cost, with the cost of machining the shafts on the Norton grinders? A. When we combine the cost of the grinder and turning, it was higher than the grinding alone. We could grind cheaper than turning and grind. It makes two operations, and is more costly.

Q. Did you personally do any work on the Gordon machine yourself? A. I personally didn't. We had a man. We picked out the best man we had in the department, and he was put on the job.

Q. To operate the machine? A. To operate the machine.

Q. And, who was that? A. His name was Albert Kipta.

Q. Did you make any suggestions at any time to anyone as to how this Gordon machine could be made to work? A. No, I didn't.

(2231) Q. Did you ever have any ideas concerning whether or not you could make it work? A. Well, I have my opinion, but it never was tried. I have my opinion what was the matter with it, but that is only an opinion.

Q. What is your opinion? A. All I know is that the machine didn't work.

Q. What is your opinion as to the cause of the trouble? A. My opinion is the design of an outfit, as you see it, it is practically impossible to operate a sharp-nosed cam. It may work on some other shape of the cam, but it wouldn't work on one like that. That is my opinion.

The Master: Why?

A. Well, there are many things enter the picture. As you see this cam here, this is continuously revolving.

The Master: You are referring—

Mr. Farley (Interposing): You are referring to the cam marked 44?

A. Yes.

The Master: Mr. Hajovich, when you make a reference to a part of the structure try to refer to it by its number. Each one of these pieces has a number.

A. In other words, cam—

Q. (By Mr. Farley, continuing): Let me ask you some questions first. The tool here in the Gordon machine is the part that is marked 37, is that right? A. Yes.

Q. And, that is going to cut on the cam shown as No. 18? A. Yes.

Q. Now, that tool is mounted in this large bracket? (2232) A. Yes.

Q. That is marked 23? A. Yes.

Q. Now, what mechanism is there in this Gordon machine which moves the tool to and from the axis of rotation of the work? A. To and from is this cam which will be—

Q. (Interposing): The cam shown in the dotted lines? A. The cam shown in the dotted lines.

Q. And, it has the number 43 on? A. That is 43. That is the one they operate, the whole back; back and forth, and as that revolved, you see, that was on the roller. At the same another—

Q. (Interposing): That roller is marked 46? A. It is. At the same time on the same shaft is another cam marked 44; a roller 53 runs on that cam.

Q. On the cam 44? A. On the cam 44. As it passes over, it gets on the high point. Now then, this roller was supposed to follow that cam, follow the cut, which will, in turn, operate the tool that will have this swivel motion. In my opinion, this, as it gets there, as it was running, it was impossible for that roller to follow. It jumped over, and then reached the spot where it should have reached, and then caused this tool to work improperly. In other words, it didn't follow the cam as it should. That is my opinion about it.

Q. Now, what means was there, as the cam shaft 18 was coming around towards the nose, what means was there

in the machine to make the tool move outwardly or towards the left, as is shown in that drawing? **(2233)** A. Well, that is the cam 43. It would have to swing this bracket away, swing away from it. Then, you see, as the roller is, that wouldn't be in here. The tool was to drop as the cam went over this end.

Q. There is a hollow part in the cam 43, the dotted line part of the cam? A. Yes.

Q. And that cam— A. (Interposing): That hollow, when the cam gets over the roller, then the whole thing comes to the cam, then; the whole bracket. The whole bracket will move toward the cam.

Q. As the hollow part is coming around, moving in the same direction, the hollow part of the cam 43 would be the part that would correspond to the nose of the cam 18, isn't that right? A. No. When the hollow part gets in there, that would be the back of the cam. When the tool is on the nose, it should be on the highest point here.

Q. The carriage has to swing to the left over in this direction? A. Yes, sir. When it goes over the nose.

Q. Yes. And as it moves over that way, what is there that will make it move over towards the left? A. This cam here, cam 43.

Q. What would work it in the other direction, then? A. The spring. The spring that holds the brackets.

Q. Can you point to the spring? A. This spring (indicating).

Q. The spring 49? A. That is right. That was to pull the brackets down; swing, **(2234)** rather, on the shaft above.

Q. The spring rests against, one end of the spring rests against a solid support, this bracket 30? A. Yes.

Q. And, the other end of the spring pushes against the screw 50, that is right, isn't it? A. Yes.

Q. So with the spring in there compressed by those two, which direction is that going to move the screw 50 and the arm 23? A. Well, that is really pulling, not pushing. When the roller follows the cam, the spring was stretching, and as the roller gets on the low spot the spring was pulling in, rather. That was the way that was.

The Master: As the roller gets in the low spot here.

A. The spring pulls the whole bracket.

The Master: Pulled it away from the roller?

A. Toward the roller.

The Master: What keeps the roller in contact when the cam has gone around the hollow part?

A. Springs.

The Master: If the springs are pulled in this way—

A. (Interrupting): When the cam goes over the roller springs are for the reason it is supposed to—the cam is supposed to be riding always on the roller.

The Master: If the spring is pulling toward the right on this drawing here, then how is it going to hold the roller against the cam? It is going to pull it away from the cam, isn't it? If you are pulling this way, toward the **(2235)** right, it is in the opposite direction from the holding it against the cam?

A. The spring is to pull the cam always tight against the roller, so it is right on it.

Q. (By Mr. Farley, continuing): But, the spring 49 is pushing on the part, and holding the roller up against the cam; pushing the part towards me (indicating) to hold it up against the cam at all times, isn't it? Suppose we look at the view in Figure 7, Mr. Hajovich, this shows the nose of the cam, the tool cutting the nose 18 of the cam. A. Yes.

Q. And it shows the roller 46 down into the hollow part of the cam 43, doesn't it, and it shows the bracket 23 pushed over toward the left by the spring 49. If you look first at Figure 6, and then see where the parts have moved from Figure 6 into the position shown on Figure 7, let us see where the high point of your cam 44 is; looking at the cam 44 here, the high point of the cam 44. A. That tool is on the nose.

Q. And, the lower part of the cam 43 has now come around so that the lower part of the cam 43 is in the cutting of the nose, cam 18, as shown in Figure 7? A. I tell you, I have this a little—I can picture that machine more in my mind, more than I do on this picture.

Q. You were confused there. You had it the wrong way around.

The Master: It may be you had a spring over here, which would pull in the other direction?

A. You see, what I was mistaken—the mistake I made, I see it now, in explaining this tool-holder here, the whole bracket, **(2236)** rather, was going in and out, but the cam remained stationary. That is where I had it reversed. I had that reversed. In other words, the tool-holder swings back and forth, but the cam remained; and, naturally, the roller, when it got in the hollow, the tool-holder followed it, and swung away at that time.

The Master: What kept the roller following the cam when it got around that low spot; what kept it following?

A. The spring here.

Mr. Michael: The spring 59.

Mr. Farley: The spring 59.

The Witness: Was pushing the bracket down.

Q. (By Mr. Farley, continuing): Just follow the connections of that part on the spring 59 shown in Figure 6. Did the spring 59 work this whole part 23, or did it work the arm 52? A. That spring worked this arm here.

Q. That spring worked this arm here which tilted the tool? A. I tell you the springs in the back of the machine —you haven't another view of this machine, have you?

Mr. Michael: What do you remember about the machine?

A. The springs that the whole arm—that spring that was to control that is always on the roller. That will be this one.

Q. (By Mr. Farley, continuing): That will be the spring 49?

The Master: Do you remember whether that was a pulling spring or a pushing spring?

A. That is a pushing spring, pushing spring. The spring would have to push that, so that it follows the cam.

Q. The spring 49 is the part which held the roller here in against the cam all the time? **(2237)** A. Yes.

Q. The roller 46? A. It followed it all the time so that the whole arm was to follow the cam.

Mr. Farley: I think that is all. You may cross examine.

The Witness: I got this a little twisted before on account of looking in the wrong place.

Cross Examination by Mr. Michael.

Q. Was the machine you had out there at the plant exactly like these drawings you are looking at? A. Yes. You are referring now to the Gordon?

Q. Yes. You don't remember much about the details of the machine, do you? A. Yes, I do.

Q. Well, you had quite a time with those drawings? A. Well, it is 19 years.

Q. Yes. And, you worked with a lot of machines, haven't you? A. Yes, sir.

Q. Do you know which cam it is in the Gordon machine that keeps the tool on the contour or tries to keep the tool on the contour of the work to be turned? A. Yes, sir.

Q. Which one is it? A. The larger one (indicating).

Q. What is the number of it? A. 44 (indicating).

(2238) Q. And, which one is it that tilts the tool? A. Well, that is the one that tilts the tool.

Q. Which one keeps the tool point right on the contour of the work that you are turning? A. That is the one; that is 44.

Q. They are both the same, then? A. No. One cam moves the whole bracket back and forth to make the cam. In other words—

Q. (Interposing): Which cam is that? A. Cam 43.

Q. Now, assuming the roller 46 is maintained on the cam 43 during a cycle of operation, won't the point of the tool be on the contour you are trying to turn throughout the complete rotation?

Mr. Farley: Do you understand the question? If you don't understand any questions—

A. Repeat that question.

The Master: Do you know what "contour" means?

Mr. Farley: Do you know what Mr. Michael is talking about when he says the contour?

A. That is the—

Mr. Farley (Interposing): Shape of the ca

A. Shape of the cam.

Q. (By Mr. Michael, continuing): Now, I am a you if roller 46 is maintained absolutely against the su of the cam 43 during one complete rotation? Will no point of the tool 37 follow the exact contour you wa turn? A. No, it won't.

Q. Why won't it? **(2239)** A. Now, wait a minut this cam was left around, there was no other cam th

Q. (Interposing): I am just speaking of the ca roller 46 and the point of the tool. A. That would them the shape of that roller. It wouldn't turn the the shape that we want to turn.

Q. Then, it is your point if we have only the ca and the roller 46, and the tool, and the work, the ca would be reproduced in the work? A. Yes, that is al would turn. You couldn't make a cam.

Q. Then, the tool point would follow rather tha shape of the cam 18, it would follow the shape of the 43? A. Much like it; yes.

Q. Well, then, it is the cam 44 that produces the in the work, is that it? The cam 44 in addition t cam— A. (Interrupting): That produces that, yes.

Q. In other words, you have to have 44—the must move the tool point with reference to the axis work? A. Yes, sir.

Q. Then, both cams 43 and 44—

The Master: Did you understand Mr. Mich question?

Mr. Michael: Read the question.

(The last question was read by the reporter.

The Master: If you don't understand any tion, just so state, and you don't have to answe you don't understand. Do you know what "ax the work" means?

A. Not quite.

Q. (By Mr. Michael, continuing): You don't what the axis of the work is? **(2240)** A. Well, axis be, well, involving the shaft, won't it?

Q. You say you are a general foreman? A. I am foreman.

Q. And, you don't know what the axis of the work is? A. Well, I was just explaining it.

Q. What do you think I mean by "axis of the work" in this drawing here that we are looking at? A. While the shaft is being turned, that is what it is. The shaft revolves. That is the axis.

Q. Well, instead of axis I will say center of the work. That means this exact center of the shaft? A. Exact center; naturally, when it is revolving.

Q. The work revolves about its center? A. Yes.

Q. And I use "axis" and "center" interchangeably? A. Yes; center of the work.

Mr. Michael: Now, we will read the question.

(The last question was thereupon read by the reporter.)

The Reporter (Reading): "Q. In other words, you have to have 44—then 44 must move the tool point with reference to the axis of the work?"

(There was no response.)

Q. (By Mr. Michael, continuing): Do you understand my question, Mr. Hajovich? We were talking about the cam 43, the roller 46, and the point of the tool, and you said just taking those elements that the point of the tool would then follow a path which corresponded more to the shape of the cam 43 than it would to the shape of the cam you wanted to cut. That is as I understood you. And, that you would need the cam 44 in order **(2241)** to correct that shape, and make the tool point follow the work that you want to get? A. You have to have either that or a different shape, but it has to be one that will work the tool, so it will work the tool, because unless you move the tool you are turning around, you won't be making the cam.

Q. Why wouldn't you? A. Because, it would be turning around; the tool will be stationary.

Q. Even though you have the cam 43? A. Cam 43 would follow—the tool, then, would be very much like the cam 43, but it won't get exactly the right shape, but it will be very much like it.

Q. But, with the addition of the cam 44, then, it is your testimony you would get the right shape? A. Providing that that cam is working right.

Q. Providing the cam 44 is working right? A. Yes; if it is so designed the tool could follow the shape of the cam.

Q. And it is your testimony that it was the movement of the roller 53 over the high point of the cam 44 that caused the trouble in the turning of the work? A. Yes, sir.

Q. And, how would that cause the trouble, or how would that affect the tool? A. Because, as I say, the design of that cam was such that it was impossible for that roller to follow.

Q. Would it be your opinion just looking at a machine operated of that kind you know it wouldn't work to cut a cam? **(2242)** A. Well, it would have to be tried just as we did. Just looking at it, it does not always answer it.

Q. Did you have anything to do with the purchase of the machine? A. No.

Q. Did you operate the machine? A. I didn't operate it myself. We had a man do that.

Q. And, these Walcott machines you bought in 1926, was it? A. Yes.

Q. What kind of tool—did they have tools that moved in and out and tilted up and down? A. They have a whole tool-holder movement; not only the tool itself. The tool-holder is entirely different than the one we are looking at. It slides back and forth, operated by a cam that we are making, and there are cams on it that also work the tool up and down.

Q. Well, when did you buy the Walcott machines? A. In 1926 we got the first one.

Q. What kind of heads did they have on them? Did the tool move up and down then, or did it rock? A. It rocked at first.

Q. When did you put on these new heads? A. I believe in 1929.

Q. Late in 1929? A. That I wouldn't know.

Q. Do you know why they were put on? A. As I understand it, it was a new tool designed by the Walcott people. It was brought in to be put to work. But, that tool that we had first, it rocked, but it wasn't the principle of this.

(2243) Mr. Farley: The tool you had first on the Walcott machine rocked, but it wasn't the principle of the Gordon machine?

A. That is right. That tool, when the roller went down, the tool went up. In other words, rocked in this motion (indicating). This one works in the same direction, when your roller goes up, so does your tool.

Q. (By Mr. Michael): I don't just follow you there. When what roller goes up? A. I am referring to this one.

Mr. Farley: 53.

A. When it goes up, so will the tool.

Q. (By Mr. Michael, continuing): In the Walcott? A. So will the tool. When the roller rises, so will the tool. The Walcott people, they made the machine, it worked this way.

Q. I thought you were talking about Walcott. You say when the roller drops, the tool drops? A. On the Gordon machine. When the roller goes down, so does the tool. On Walcott, when the roller goes down, the tool goes down.

Q. Just explain to me how the Gordon tool can go down when the roller goes up. A. Here you are revolving this here. When this goes up, this goes down, don't it? When that goes down, the tool goes up.

Q. You mean it tilts the tool up. How about the point of the tool? A. You are tilting the point of the tool. That is what I am telling you.

Q. Does the point of the tool go up? A. In the same direction as the roller.

(2244) Q. I see. Did you have anything to do with the difficulties with the Gordon machine? A. Yes.

Q. Did you supervise any of the work on it? A. Yes.

Q. Did you ever have any trouble with the eccentric, the pump eccentric, cutting the pump eccentric? A. The pump eccentric was all right; that we didn't have much trouble with.

Q. Didn't you have any trouble with it? A. With the pump eccentric, that was perfectly round.

Q. How about the timing of the cams? A. The timing was off altogether.

Q. The timing was off. Do you remember them coming there and putting a new set of master cams on, or re-

positioning them with keys? A. You are referring now to Gordon?

Q. Yes. A. Well, we had a man there. He did many things, and as a rule when we have trouble, the man when he was called in, then, of course, he was the man to show us what has to be done, and how to operate it, which he failed in. He tried, and what he made was no better than the one we made.

Q. What did you do to the machine? Or, what do you know that your men did to the machine? A. Well, he tried everything. He replaced some parts.

Q. You are speaking of the Gordon man now? A. Yes. They were grinding the tools different; set them up and try them. Whatever he did, when the shaft was taken out **(2245)** and checked, it was found not right. The shape of the cam was always wrong.

Q. All the way around or just in these two places? A. At the nose.

Q. On each side of the nose? A. Side of the nose.

Q. Was there a counter-shaft on the machine? A. No, sir. Now, wait a minute, there was a counter-shaft, belt-driven.

Q. The counter-shaft was on the machine? A. No. Above on the ceiling.

Q. Did you have any trouble with the counter-shaft? A. No. That is simple. There was only one belt to pull it. There was no trouble with pulling.

Q. Did any of the springs on the machine break? A. I don't recall that. I don't think so.

Q. Well, you do recall, as I understand you, that you had this machine in there two or three months trying to make it work, and finally you abandoned it? A. Yes.

Q. And, according to some records here, the machine was scrapped in 1927? A. Well, I tell you, the machine was moved out of the department and stored where we store all the obsolete machinery, and was standing in there until it was junked, or whatever they did with it. As I understand it, it was sold for scrap.

Mr. Michael: Track 297. That is all.

Mr. Farley: That is all.

(Witness excused.)

(2246) ALBERT KIPTA was thereupon called as a witness in behalf of the Defendant herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Farley.

Q. Where do you live, Mr. Kipta? A. 3437 Jackson Boulevard.

Q. Chicago? A. Yes, sir.

Q. And, you work for International Harvester? A. Right.

Q. What is your position out there? A. Well, I balance all the crankshafts, flywheels, and I have other special work to attend to besides that.

Q. Are you employed as a foreman out there? A. No.

Q. How long have you worked for the International Harvester? A. Well, I started with the International Harvester Company in 1912, the 12th of October, and I left once or twice there; twice.

Q. Were you employed there in 1920? A. Yes.

Q. Did you have anything to do with a Gordon camturning machine? A. I was the operator.

Q. And, you remember the machine? A. Yes, I remember the machine.

Q. Could you state in a general way just what experience you had with that machine at International Harvester? A. Well, I operated it for several weeks, and never turned out a **(2247)** shaft that would be suitable to our company.

Q. Did you operate or attempt to operate the machine when it first came in? A. Well, I can't really recall whether it was the first day or so after the machine was set up or not, but I was the first operator on the machine.

Q. And, had you had any particular experience in operating machines before that? A. Oh, yes. I served my time as apprentice.

Q. Apprentice machinist? A. That is right.

Q. Where did you serve your time? A. Well, I used to be with the Excelsior Company; that is the name of the company now. Previous to that it used to be a bicycle company. It used to be on Randolph, and I just can't recall the street.

Q. You say you never turned a shaft suitable for use for your company, or something to that effect? A. Yes.

Q. What was the trouble with the shafts, with the machine, that you couldn't use them? A. I don't know if there was any trouble with the shafts or not. I think the trouble was with the machine. It would either leave a big hump on the cam, or cut the nose off the cam.

Q. Did you know enough about machinery to attempt to adjust the machine, or to overcome that trouble? A. Yes, we tried to do everything we possibly could.

Q. What if anything do you remember attempting to do? A. Such as adjusting the tools to a set position.

(2248) Q. What were you using at that time in the International Harvester place to machine your cam shafts? A. What were we using?

Q. Yes. A. We were rough-grinding the crankshafts.

Q. Cam shafts? A. Cam shafts. I am working on crankshafts; I get that a little bit mixed up.

Q. Did you ever try at any time to take two cuts on this Gordon machine? A. Yes.

Q. And did you, yourself, make the adjustments on the machine by means of which you could do that? A. Well, we always had some assistant to help us in making the adjustment.

The Master: How did you take the two cuts, by re-setting the tool on the second cut, or simply run through with the same set?

A. You couldn't very well do it with the same set, because you wouldn't be taking off any stock. You would have to re-set the tools.

Q. (By Mr. Farley, continuing): You don't remember what mechanism there was, if any, there to let you re-set the tools of the Gordon machine? A. No, I really can't recall that.

Q. But, there was some sort of a mechanism? A. Yes.

Q. Would you personally make the adjustment to see you were getting your cams the size you wanted them on the machine, or **(2249)** did you have some other machine setter? A. Well, I have done it, yes. I have done it.

Q. On the Gordon machines? A. On the Gordon machines.

Q. Now, did the machine work any better when you would take two cuts off? A. No, I can't say that it di .

Q. And, even with the two cuts, would you still get the hollow on one side and the hump on the other side of the cam? A. That is right.

Q. I didn't have Mr. Hajovich identify these drawings, but did you know these cam shaft drawings there? Do you recognize them as any cam shafts you ever made at the International Harvester (handing documents to witness)? They are Exhibits 310 and 311. A. We didn't have any other shaft at the time I was there except that one shaft.

Q. Is that a cam shaft such as shown in this Exhibit 310? A. Well, I don't know really. I think the number of the shaft, job number, I think was 8049-T. If I can—

Q. (Interposing): That is the number on this particular drawing, is it not? A. I can't see that very well, because I haven't got my glasses, but that is what the number was.

Mr. Farley: I think that is all. You may cross examine.

Cross Examination by Mr. Michael.

Q. You say you took two cuts on the Gordon machine? (2250) A. We could take two cuts, yes.

Q. How could you? A. Well, that is something that I really can't recall right now, but I know we tried to take two cuts on it.

Q. You said you tried to? A. Yes.

Q. Did you succeed? A. Well, evidently we didn't, because we couldn't very well use the machine. It didn't do any good to do it.

Q. Did you take two cuts? A. Yes. We have tried it.

Q. Well, how did you do it, then? What did you do then to the machine in order to take two cuts? A. Well, we would have to set the tool up in some way.

Q. How? A. That I can't really tell you.

Q. Do you know how the tool was mounted in the machine? A. Yes. It was a circle tool, and on an arm.

Q. What held the tool on the arm? A. There is a screw that held the tool in the arm.

Q. Just how would you go about taking two cuts with it? A. Well, I really don't know just how we would explain that, because I really can't tell you offhand how I have done it. But, it was either setting the tool one way or another, or there was some adjustment to it.

Q. There was an adjustment on the tool that you could move it out or in, is that it? A. Not in or out, but you could turn the tool, either lower or higher. I think there were some adjustments there that I (2251) couldn't recall. But, I know we have tried to take two cuts.

Q. And, you did take two cuts? A. Yes.

Q. How much metal did you take off on the second cut? A. That I really don't know.

Q. You are sure you took it by adjusting the tool? A. Yes.

The Master: Are you sure you adjusted the tool rather than simply taking another cut without adjusting it?

A. Well, I don't know how you could take another cut if you didn't adjust the tool.

The Master: I am wondering if you definitely recall that, or just simply remember you took two cuts, and you think you couldn't take two cuts in any other way, and therefore you must have done it that way. Do you recall actually making readjustments?

A. Yes, there was some adjustment there.

Q. (By Mr. Michael, continuing): Was there some adjustment on the machine when it was delivered? A. I don't know whether it was on the machine or on the tool, but I know we took two cuts, and made some changes there.

Q. What other changes? A. That I don't know.

Q. How long did you work with the machine? A. Anywhere from five to eight weeks off and on.

Q. How long every day, for instance? A. Well, we put in a nine-hour day.

Q. How many shafts did you turn on the machine a day? A. Well, not very many, because—we always had the machine, (2252) trouble with the machine.

Q. How many would you say? A. That I couldn't tell you.

Q. You don't know whether it was two or a hundred? A. Well, we have tried more than two, and we didn't make a hundred. We wouldn't go to that expense of scrapping all those shafts.

Q. It was all scrap? A. That is right.

Q. You never got a good shaft on the machine? A. That is right, we never got a good shaft on the machine.

Q. You never even turned one good cam on the machine? A. Well, I don't say we didn't turn one good cam, but the cam shaft was no good after we got through turning it.

Q. It just was scrap? A. That is right.

Q. The shafts you put into the machine were good shafts? A. They were forged shafts, yes.

Q. Regular standard shafts? A. That is right.

Q. And, when they came out they were all scrap? A. When we turned them on the machine they were all scrap.

Q. All scrap. Would you recognize a drawing of one of the cutting units of a Gordon machine if you saw it now? A. I think I could.

Q. Look at this drawing here, 47-A. Do you recognize that (handing document to witness)? A. Well, I can't see this so well.

Q. Haven't you got your glasses? **(2253)** A. No, I haven't.

Q. Do you suppose mine would help you any? A. I don't know whether they would or not. I really can't see this very plain, to tell you the truth.

Q. Can you see it plain enough to tell us how you took two cuts on it, or did you take two cuts? A. No, I can't.

Q. Can you see it well enough to know you couldn't take two cuts? A. No, I couldn't see that at all.

Mr. Farley: Do you want me to tell you how you can take two cuts? I know machines; I can tell you.

Mr. Michael: Well, you would have to add something to it, I think.

Mr. Farley: I think I will leave that for argument.

Q. (By Mr. Michael, continuing): Did you see a Gordon machine operated in any other plant? A. No, I haven't.

Q. Did you work with the Gordon man when he came to remedy the trouble? A. Well, no, I didn't work with him, but I watched him for a while. I was on the floor.

Q. After he spent some time with the machine did it work, did he get it working? A. Well, if I recall, I believe that the man really left the machine, and it wasn't in any better condition than when we called this man to come in.

Mr. Michael: That is all.

Mr. Farley: That is all.

(A discussion was had off the record.)

(2254) Mr. Ohrn: May I say a word?

Mr. Farley: Yes.

Mr. Ohrn: I just wanted to point out that we have much trouble, and Mr. Lander would go to any extreme to make that machine work. And, if he found a way it would work, he would rebuild the whole machine in order that we could use it.

The Master: You say he would do that because he felt he was responsible for the machine for having bought it?

Mr. Ohrn: Yes.

The Master: What was it you wanted to say?

Mr. Hajovich: In regard to that two cuts, when the trouble arises it don't have to be on that particular machine, but as it was on this, when the men come in to try to make it work, the distinction was whether it was because too much stock was removed on the cam, so it was tried by taking a lighter cut, to see if the shape would change on a cam with the lighter cut, but that machine was not built to take two cuts. It was built to take one cut.

Mr. Farley: Do you know whether it was possible or not to fix the machine so that it could take two cuts?

Mr. Kipta: To take two cuts on that Gordon machine, it would have to be rebuilt entirely. As it was, there was an adjustment, but no such thing that it would adjust itself like the Melling cam lathe does. That is built for two cuts; the Gordon did not have that.

Mr. Farley: I guess that is all.

(The witness was thereupon excused.)

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(2258) WILLIAM D. HUNT was thereupon recalled as a witness on behalf of the Defendant herein, and having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Farley.

Mr. Farley: Will you mark these, please.

(Two documents were thereupon marked Defendant's Exhibits 312 and 313, respectively, by the reporter.)

Q. You are the same Mr. Hunt who testified here before? A. Yes, sir.

Q. I would just like to ask you, Mr. Hunt, about the machines that you supplied to the Ford Motor Company, Walcott machines supplied to the Ford Motor Company, and I show you a copy of the Melling Patent No. 1,512,995, which I have had marked Exhibit No. 312.

(Handing document to the witness.)

Are you familiar with that patent, and, if so, would you please (2259) state whether or not the machines which you supplied to the Ford Motor Company had that construction in it for the purpose of taking two cuts? A. Yes, sir. I am familiar with that, and those machines were so constructed.

Mr. Farley: I would like to offer this in evidence as Exhibit No. 312. That is Patent 1,512,995.

Mr. Michael: That is already in.

Mr. Farley: Not that particular one.

Mr. Michael: What is the number of it?

Mr. Farley: 1,512,995.

Mr. Michael: Oh, I see.

Mr. Farley: I might state for the purpose of the record that the other Melling patent, which we introduced in evidence as Exhibit 209, was Melling Patent 1,655,655, is drawn to the proposition of the manner in which the tool is moved in the Walcott machines, whereas this patent has to do entirely with the mechanism for having the machine perform two cuts.

The Master: Any objection to the admission of that?

Mr. Michael: I don't know what the purpose of the offer is. What is it being offered for? I don't see any relevancy.

Mr. Farley: The purpose of the offer—do you want to hear from me now?

The Master: Yes, state what your purpose is.

Mr. Farley: The purpose of the offer is, it goes to the matter of apportionment of profits. There are two features to the Melling machine that the Patent Office has granted **(2260)** patents upon, therefore recognizing them as patentable improvements, and that is the purpose.

The Master: If the only objection is relevancy, I will admit the exhibit.

Q. (By Mr. Farley, continuing): Now, Mr. Hunt, with respect to the machines that were sold to the Ford Motor Company, the Walcott machines, my understanding is that all of those machines had a tilting tool in them? A. Yes, sir.

Q. Did the Walcott Company always continue to manufacture machines of that particular type? A. No, the Walcott Machine Company are now manufacturing machines with the parallel type tool-holders, in which the tools do not tilt.

Q. And, just how do the tools move in the type of machines that you are now manufacturing? A. The type of machines that are now being manufactured, known as the parallel type tool-holders, the tool is held parallel in all positions by the arm that carries the top part of the tool-holder, and an arm mounted a short distance below that, those two arms being so fastened that they are parallel to each other, therefore causing the holder that carries the tool to always remain in a parallel position.

Q. I show you a copy of Melling Patent No. 1,634,550, which I have had marked Exhibit No. 313, and will you please state whether or not the mechanism which you just described is as shown in that patent (handing document to witness)? A. This patent is the parallel type tool-holder machine.

(2261) Q. Now, are you familiar with machines of the Walcott Company that were sold to, and are in use by, the International Harvester Company at their Chicago plant? A. Yes, sir.

Q. And, will you state whether or not, or, will you state which type of machines they are, whether they are of the tilting tool type, or the type shown in the patent, Exhibit No. 313? A. The machines now in use in the Chicago plant are the parallel type tool-holders.

Q. And, are they like the mechanism shown in this patent? A. Yes, sir.

Q. Have you any blue-prints of the Walcott Company that illustrate that mechanism? A. I have the print, assembly print, of our present tool-holder of the parallel type.

Mr. Farley: I wonder if you would produce it, please.

(The document above-referred to was thereupon produced by the witness.)

Mr. Farley: Will you mark this, please, Mr. Reporter?

(The document above-referred to was thereupon marked as Defendant's Exhibit 314 by the reporter.)

Q. (By Mr. Farley, continuing): You have produced blue-print of the Walcott Machine Company, drawing No. C-2129, which I have had the reporter mark Exhibit 314. Will you please state whether or not that shows the same mechanism as is described in the patent, Exhibit No. 313? A. This construction is exactly the same, as far as the principle is concerned, as the one shown in Patent 1,634,550 with the upper arm carrying the top part of the tool-holder, and the **(2262)** short parallel link below it causing this tool-holder to travel in a parallel motion as it is moved back and forth by the overhead tool control cam.

Mr. Farley: Perhaps you would like to look at this, Mr. Spohn (handing document to Mr. Spohn).

Mr. Spohn: All right.

Q. Now, is the mechanism shown in the blue-print, Exhibit 314, the type of mechanism which the Walcott Company is now supplying to purchasers concerning which Mr. Michael asked you several questions when you were here last? A. Nearly all of the tool-holders now built are of the parallel type construction.

Q. You have made some improvement in the machine in recent years, however? A. Yes. The machines have

been improved; the location of the overhead cam has been changed, which makes it better to make a tool control cam or better construction.

Q. Are you familiar with the so-called Blanchard principle of operation? A. As I understand the Blanchard principle of operation it is practically the same as the parallel type construction I have here.

Q. Now, will you state whether or not, in employing the Blanchard principle as it is used in the Walcott machines, it is essential or necessary to tilt the tools? A. The fact that we are turning cams successfully with the parallel type tool would seem to me to prove conclusively that it is not necessary to tilt the tool.

Mr. Farley: I offer Exhibits 313 and 314 in evidence.

(2263) Mr. Spohn: Are they still on the question of apportionment, those same two offers?

Mr. Farley: Yes.

Mr. Spohn: We just object on the same grounds as the others, your Honor, the materiality and relevancy of them.

The Master: I think the materiality of these may be a little more remote than the other exhibit, but I will admit them in evidence.

Mr. Farley: I might state, your Honor please, on that point, so that you might understand my reasons for producing these, you will recall that the witnesses Hajovich and Kipta of the International Harvester Company described how the machines in their plant, that the tools moved straight up and down, and I thought it would clarify the record if I had actual showings as to just what that movement was.

The Master: All right.

Mr. Farley: That is all. You may cross examine.

Re-Cross Examination by Mr. Michael.

Q. Mr. Hunt, do you still sell some of these Melling type of machines where the tool tilts? A. There are occasionally tool jobs that go out with the tilting tool. I believe there are some firms that have permission to use the tilting tool if they so desire.

Q. It is only in connection with orders from concerns of that kind that you supply the tilting tool? A. Yes, sir.

Q. And, you supply the machines of the parallel holder type to **(2264)** non-licensees, is that it? A. Well, I wouldn't say exactly that, because we are furnishing the parallel type tool to companies that are also licensed to use the tilting type tool.

Q. And, do you furnish such companies with the sliding type of tool on new machines, or on machines they already have? A. Well, we furnish most of the new—practically all of the new machines that go from our plant are with the parallel type heads. Some of the old machines are repaired, rebuilt, and where they have the tilting type heads, the repaired or new heads required on that machine are of the tilting type. Or, again, they sometimes change over and go to all the one type, or the parallel type heads.

Q. Then, on all orders for new machines, at the present time, you supply the parallel type head? A. We built all that type this last year; there were not any type new machines that went out without the parallel type on in the last year.

Q. How long has that been your practice? A. Well, that is according to the customer, whether he has a license to use the tilting type, and which is it. If he wishes the tilting type, and because of the fact he had them previous to that, why, if he orders them he gets them.

Q. Is the production the same on each type? A. Well, on our latest design of the type KT, because of the shape of the overhead or tool control shaft, we are able to turn more cams than we are on the old tilting type machine.

Q. And that improvement was made when? A. I can't give you the exact date. It is within the last eight **(2265)** years, I believe.

Q. Within the last what? A. Eight years.

Q. That you have been selling the latest improved type of sliding— A. (Interrupting) I couldn't give you the exact date of that.

Mr. Farley: It is approximately eight years?

The Witness: I believe it is.

Q. (By Mr. Michael, continuing): That takes us back to 1931? A. Yes. I rather think we could get—it might not be quite then. I would have to look that up, but it is right around that date.

Q. Then, it is your testimony as early as 1931 you were offering the trade a machine of the type shown in this blue-print, Exhibit 314, which gave more production than the production of the machines with the tilting tool? A. This head as so constructed here was put out in 1929; this type here (indicating).

Mr. Farley: Referring to Exhibit 314?

A. Exhibit 314 was put out in 1929.

Q. That didn't embody the improvement? A. That didn't take the latest improvement, no.

Q. Then, beginning in 1931 you sold machines embodying the latest improvement, which machines gave a production greater than the tilting tools? A. Yes.

Q. And, how many of the tilting tool type would you say you sold since 1931? A. I wouldn't state, because I haven't any idea.

Q. Would it be five, or ten, or more? **(2266)** A. I wouldn't care to say. When I was here before I made a statement as to the number of machines we had sold in the past year. When I went back to Jackson I asked them to look up and see how many of the machines were of the tilting type. There wasn't any. That is as far as I asked. So, I am not—I wouldn't know.

Q. You only asked about the last year's? A. Yes. I guessed about the last year, and I asked about the number of the tilting type machines that had been sold in that year. So, I am not familiar enough with that to answer it.

Q. When did you sell—how many of the machines did you sell to International Harvester Company? A. Over a period of years there is, I imagine, around five.

Q. Cam turning machines? A. Yes, sir.

Q. When did you sell them the first one? A. That was back in 1926, I believe.

Q. When did you sell them the others? A. Well, along over a period of years. The first one was, of course, the first one was the old type of tilting tool.

Q. And then you later changed the heads on that machine, didn't you? A. Yes, sir.

Q. When did you change them? A. That would be after '29, or during '29. I don't know the records.

Q. Do you know why you changed them? A. No, other than that they purchased them.

(2267) Q. Were they changed at your invitation, or did the company direct that they be changed on the first machine? A. Well, I am in the engineering department; and, of course, the sales department, I have no connection with that in the way of selling, so I wouldn't know whether International Harvester Company approached us, or whether we approached them.

Q. On the heads you gave them in exchange or to replace the tilting tool type, did that embody the latest improvements that you have now? A. That is this type as shown here on Exhibit 314.

Q. How did the production of that type compare with the tilting tool type? A. They were practically the same.

Q. Well, were they the same? A. I would think they would be.

Q. You would get just as many shafts on one machine as you would on the other? A. Yes.

Q. Then, why would you say they changed? What was the change made for? A. I presume the change was made because of the new patent issue.

Q. What do you mean by that? A. There was a new patent issued on this type of head.

Q. You never make changes in new machines until your patents issue? A. Yes, we make a lot of changes without having patents.

Q. What do you mean you suppose you made it because there was a new patent issue? A. We had a new type of head and a new patent was allowed; therefore, (2268) those heads were used on the new machines, or any replacements.

Q. Do you recall why you designed the new type of head? A. Because there was a patent suit pending in regard to the old type of head.

Q. Prior to the time you designed this new improvement on the sliding—what do you call it, parallel type of head? A. This is the parallel type head.

Q. Prior to the time you designed the new improvement on that, that gave you the increased production, did any of the authorized licensees of the tilting tool type change over to the other type of head? A. Yes, sir, because most of those have this type of head. The new improved type is an entirely new machine, and you couldn't put this head on the old machine.

Mr. Farley: The witness refers to the Exhibit 314 when he says "this."

A. Yes. This 314 is the head that went on all of the old type machines that have been replaced.

Mr. Farley: Off the record a minute.

(A discussion was thereupon had off the record.)

The Witness (producing document): There is no difference in the principle of the machine you see here. Here in this case your overhead cam contacts this roll here if the distance from here to here is greater than the distance from here to your pivot, this cam has to have a larger throw on it. This roll is located directly over the cam, and the throw on the roll, or overhead cam that controls that roll, is **(2269)** equal to the distance of the rise and fall of your tool.

This construction is exactly the same as this, as far as the principle is concerned, both parallel type heads.

Q. (By Mr. Michael, continuing): He is comparing Exhibit 314 with a new print he has just produced, marked KT-530A, and as I understand your testimony, this print KT-530A discloses or shows the newest type of head, is that right? A. Yes, sir.

Q. And, you say they are both of the same principle? A. Both of the same principle.

Q. And, they are both the same as the Blanchard principle? A. Yes, sir.

Q. And how about the tilting tool type of head, is that also the same principle as these? A. The tool does not tilt, and in the old type the tool does tilt. In that the principle is different.

Q. I am asking you, rather broadly, now, is the principle of the tilting tool type head the same as the Blanchard principle? A. Well, it has the same movements.

Q. I am asking you if it is the same principle? A. I believe it is.

Q. In other words, the same principle as these? A. No.

Q. These, you say, are like Blanchard's? A. These are like Blanchard's, but this does not tilt the tool, and the fact that the other one does makes the two heads different.

Q. In principle? A. If one tilts, and the other doesn't, it will differ.

(2270) Q. The tilting tool type of head is not on the Blanchard principle? A. No, I didn't say that.

Q. What do you say? It is? A. I believe you can construe it to be of the Blanchard type.

Q. And this print, Exhibit 314, is also of the Blanchard principle? A. This is the Blanchard principle.

Q. And, the one you just produced? A. That is the same principle as this.

Q. Then, all three of them are the same principle? A. With the exception of one tilts the tool, and the other does not.

Q. I understand, but that is a detail, isn't it? They are all the same principle? A. Well, I don't know whether you would call that a detail, or whether it is a major construction of the head.

Q. Are they all the same principle? Are they all the same principle as Blanchard's? A. I am not a patent attorney.

Q. I am not asking you as a patent attorney. A. And, I am not in a position to answer a technical question of that type. I am not that, and I don't care to answer that, because I am not—I haven't studied patents enough. I can tell the construction of these different heads. When you go into the matter of minor or minute details of that, I don't know if I am absolutely qualified to answer.

Q. I am not going into minute details. I don't want to consider details. You said, in answer to Mr. Farley, this was a great deal on the Blanchard principle? A. Yes, sir.

(2271) Q. Is it? A. Yes, sir.

Q. Is this one KT-530A? A. Yes, sir.

Q. Is the tilting tool head? A. The difference in the construction of these—

Q. (Interposing): I am talking about principle now, not construction. A. The fact that this contacts the roller here is the same as in the tilting type. The fact that this arm operates around a center is of the same type as the tilting type, but when you get to the point of the tool, one tilting and the other parallel, there is the only difference in these two heads, as far as principle is concerned.

Q. Between what two heads? A. This head and the tilting type head.

Q. 314 and the tilting type? A. Yes. The difference is one has the parallel type tool that does not tilt, and the other does, and holds your cutting angle.

Q. But, are they, or are they not, the same principle as Blanchard? A. I told you that I didn't feel I was qualified to answer technical points.

Q. Then, when you told— A. (Interrupting): This point is a matter of construction. This from here and the others, there is the difference in those heads. If the Blanchard principle does not require the tilting of one, and the parallel of the other, if that doesn't make a difference, then they are both alike.

(2272) Q. Then, when you told Mr. Farley this Exhibit 314 was made on the Blanchard principle, do you want to withdraw that, or do you want to stick to it? A. It may be that is correct from what I have read of the Blanchard principle.

Q. What about this one, KT-530A? A. That is the same principle as this. The principle of those two are exactly the same.

Q. And, they are both the same as Blanchard? A. I believe they are the same as Blanchard. I don't understand the part of the tilting.

The Master: You have got a good deal on that testimony referring to that latest print. I think it ought to be marked and admitted in evidence, at least for the purpose of indicating what the witness is talking about.

Mr. Farley: I will ask that the drawing, KT-530A, be marked Defendant's Exhibit 315.

(The drawing above-referred to was thereupon marked Defendant's Exhibit 315 by the reporter.)

Mr. Farley: And, I offer that exhibit in evidence.

The Master: I will admit it.

Mr. Farley: I don't know whether—was that all you had, Mr. Michael?

Mr. Michael: No.

Mr. Farley: Pardon me.

Q. (By Mr. Michael, continuing): Do you remember when you first made the new parallel link type of head? A. The date on that print, I believe, is 1929. I think they were designed the latter part of '28.

(2273) Q. Is this the patent covering the parallel link type of head, 1,634,550, Exhibit 313? (Handing document to witness.) A. Yes, this is your parallel type head.

Q And, you first made it in 1929? A. The date here is '29 on this assembly, but, undoubtedly, the head was designed before that.

Q. How long before? A. I would say in the latter part of '28. Some time during '28.

Q. And, you think you first sold it in '29, is that it? A. I think either the very last part of '28, or first part of '29.

Q. The patent, 1,634,550, Exhibit 313, was issued in 1927, wasn't it? A. Well, the date is on there.

Q. There is the date on it, and it was filed, the application for the patent was filed in 1926? A. Then, it must have been designed then—started.

Q. When? At least as early as 1926? A. Yes.

Q. "Started," you mean completed? A. The heads, there might not have been any of them being used. The drawings might not have been completed and sold until 1929.

Q. You know they weren't sold before 1929, don't you? A. I would think they weren't.

Q. You know they weren't? A. I would have to look up the records.

Q. And, you know why they weren't sold until 1929, don't you? A. I don't remember the dates. I know when they started to sell them; yes, sir.

Q. Was it in relation to anything else that happened that helped **(2274)** you fix that? A. I think I stated it.

Q. The patent suit, or decision of the Court of Appeals? A. The patent suit; the patent pending.

Q. Do you remember the Court of Appeals deciding the Walcott case in 1929? A. I didn't know the date of that.

Q. Don't you know that that is why the company didn't sell these until 1929? A. They didn't design them until they thought they wanted to design a different type of head because the patent was pending.

Q. They designed them three years before 1929, didn't they? A. Not in our department.

Q. How do you account for this? Doesn't that show all of the details? A. Yes, sir.

Q. Then, they had it designed three years before 1929, didn't they? A. They had it designed as far as the patent was concerned, but as far as the drawings were concerned,

I don't think you would find the work drawings were designed until later.

Q. Would it take three years to design working drawings? A. No, sir.

Q. Then, why didn't they design a working drawing prior to 1929? A. That you would have to ask the print room.

Q. That you don't have any idea why, do you? A. I could have.

Q. Have you? A. Yes, sir.

Q. What is your idea? **(2275)** A. Because there was a patent suit pending, that is the reason.

Q. In other words, you didn't think well enough of this thing shown in this patent, Exhibit 313, to make it until you had to make it? A. Well, it cost money to bring out a new type head.

Mr. Michael: That is all.

Mr. Farley: Just one question, Mr. Hunt.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. I am not sure it is entirely clear as to whether or not, when you changed over any of the machines which had a tilting tool to the type of head shown in Exhibit 314, what effect that had on the output or production per hour of the machine, as to whether it increased it, or decreased it? A. The parallel type head as shown here, when we built those heads and sent them out, we sent them out with the quotation as we did on the tilting tool. In other words, we felt that the machines would produce as many shafts, and have proven to produce just as many shafts with the parallel type head as with the tilting tool head.

Q. Did I understand you to say just then they have proven in actual production, actual practice, they have turned out just as many? A. Yes, sir.

Q. That has been your experience? A. Yes, sir.

Q. They actually have turned out the same production as the ones with the tilting tool? **(2276)** A. Yes, sir.

Q. Just on that point now, can you state whether or not the change to the parallel type head as shown in Exhibit 314 involved any higher maintenance cost as far as the tools were concerned? Did the tools hold up as well, if you know, on Exhibit 314 as they did on the tilting? A. As far as I know, the tool cost was practically the same.

The Master: Did you make any other changes in the machines at the time you put this new type head on which might increase its efficiency?

A. We simply took the old heads off and replaced them with these heads, making no other change in the machine at the time. The change in the machine was made later when we decided to make a different type, or replace the overhead cam in a different position in order to get a better construction of the two control cams. That was a later development.

Q. That is the KT model? A. Yes, sir. That was entirely later development. These heads are interchangeable on the machines. This head of Exhibit 314, of the tilting type head, are interchangeable on the machines, with the exception you have to make overhead cams when you make heads.

Q. You have to change the overhead cam? A. You have to change the overhead cam.

Q. When you substitute Exhibit 314 for the old tool tilting head? A. Yes, sir. Outside of that they are the same.

* * * * *

(2278) CHARLES GORDON was thereupon called as a witness on behalf of the Plaintiff herein, and having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Michael.

Q. Mr. Gordon, at the time of entry of the final decree in the Walcott case, or at any other time, did you know, or have you known, that the Walcott Company had guaranteed the Ford Motor Company that the Melling machines would not infringe any patents, and had undertaken to indemnify and hold the Ford Motor Company harmless in the purchase and use of those machines? A. No, sir.

Q. Did you ever see the Ford purchase order for the Walcott machines prior to this lawsuit? **(2279)** A. No, sir.

Q. Did you at any time have any knowledge of the Ford Company's practice or custom respecting patent guarantees? A. No, sir.

Q. I think Mr. Farley asked you to produce the purchase order for the Gordon machine. Did you make a search for that? A. Yes, sir.

Q. Did you find it? A. Yes, sir.

Q. Can you produce it? A. This is the purchase order that I found (producing document).

Q. Does that contain a patent guarantee? A. It does; what I consider is a patent guarantee.

Q. Down in the fine print at the bottom? A. Yes, sir.

Q. When did you first observe, or when were you first aware that there was a patent guarantee in this order? A. When I found it about two weeks ago, I think it was.

Q. Was the machine covered by this order that you have produced from the Ford Company for the Gordon machine ever paid for? A. No, sir.

Q. Did you ever know that the National Automobile Chamber of Commerce was defending, or had defended, the Walcott Company's suit brought by your company for infringement of the patent here in suit? A. No, sir.

Q. Have you read the testimony of the International Harvester Company witnesses? A. I have.

(2280) Q. Do you recall the sale of a Gordon machine to that company? A. I do.

Q. What company sold the machine to International Harvester Company? A. The Charles Gordon, Incorporated.

Q. Were you an officer of the Charles Gordon, Incorporated? A. I was.

Q. At the time the sale was made? A. Yes, sir.

Q. Is that company still in existence? A. No, sir.

Q. What happened to it? A. That company was dissolved quite a number of years ago.

Q. And, the business in these Gordon machines was thereafter carried on by what company? A. The Production Machine Tool Company.

Q. And, after that by what company? A. By the Gordon Form Lathe Company.

Q. The plaintiff in this suit? A. Yes, sir.

Q. Where and by whom was the machine sold to International Harvester Company built? A. That machine was built by the New Process Specialty Company.

Q. They were located in Milwaukee? A. Located in Milwaukee.

Q. They were built under contract with Charles Gordon, Incorporated? A. Yes, sir.

Q. Was it one of the early machines built under your patent, or **(2281)** according to your invention? A. I think it was the third or fourth machine that we built. I know it was built by the New Process Specialty Company, and they completed the experimental machine and built five more under contract, and it was one, I think, of the earliest ones that they delivered.

Q. Who, or what company, started the first experimental machine? A. The Monarch Machine Company of Milwaukee.

Q. Then, when that machine was partly completed you took it away from them and gave it to New Process? A. As I remember, that company was dissolved. Anyway, they sold all their equipment, and called me up one day and told me I would have to take anything we owned out of their plant because they were no longer operating.

Q. And, that is when you made your connection with this New Process Specialty Company? A. Yes, sir, we had everything shipped over from the Monarch Machine Company over to the New Process Specialty Company.

Q. And, the New Process Specialty Company completed that first experimental machine? A. Yes, sir.

Q. And built how many more, do you know? A. Five more.

Q. To whom, if anyone, did you sell the first experimental machine? A. The original experimental machine was sold and delivered to the Nash Motors Company, Kenosha.

Q. And, how many more machines did New Process build for you? **(2282)** A. Five.

Q. Five. And, this one that you sold to International Harvester was one of those five? A. Yes, sir.

Q. Did you personally have anything to do with the sale of the machine to International Harvester Company? A. I did not. It might have been that I had—I might even have helped draw up the quotation on the machine, that we made to them. I might even have called up the Purchasing Department in connection with that, but I doubt very much whether I had. I can't recollect anything. I have tried very hard to find out just what that connection was, whether it was done by correspondence or otherwise.

Q. Do you recollect definitely whether or not you had anything to do with the machine after it was delivered? A. I know positively I had not.

Q. You never saw the machine in the plant? A. I never saw the machine in the plant at any time.

Q. Who, on behalf of Charles Gordon, Incorporated, did have anything to do with the machine after it was delivered to International Harvester? A. There were two men in my employ that had something to do with it. One of them was my son, L. W. Gordon, and the other one was Frank C. Litchfield.

Q. Mr. Litchfield is dead now? A. Yes, sir. That is, I have been advised he died some three or four years ago, but I am not sure when it was.

Q. Who, on behalf of the Charles Gordon, Incorporated, installed or **(2283)** demonstrated the machine after it was delivered at the International Harvester Company? A. L. W. Gordon was sent down there to demonstrate the machine.

Q. Have you consulted him about the matter? A. I have.

Q. Did you obtain a report from him on it? A. I did.

* * * * *

Q. (By Mr. Michael, continuing): Did you have, or the Charles Gordon, Incorporated, ever receive any complaints or calls from International Harvester Company about the machine after it had been set up and demonstrated? A. Not to my knowledge.

Q. If there had been— A. (Interrupting): Pardon me. Perhaps I should mention that we got a call, that is, I was advised that we had a call from my **(2284)** son when he was down there demonstrating the machine that there was an eccentric on the shaft that was to be turned, and that eccentric was not exactly cylindrical. And, it was my understanding that he, in some way—I don't know how—got in touch with Mr. Litchfield, who was the draftsman, and had him go down there to see what the trouble was. When he got there he found the trouble and remedied it during the time he was demonstrating the machine.

Q. All this matter you refer to was during the demonstration of the machine? A. That is my understanding.

Q. Before it had been turned over to International Harvester? A. Yes, sir.

Q. Well, were there any other complaints that you know of? A. No, sir.

Q. And, if there had been would you, as president of the company, have known about it? A. I certainly think I would.

Q. Was the machine paid for? A. Yes, sir.

Q. Have you made a search of the Charles Gordon, Incorporated, records to determine dates of shipment and invoicing, payments, and so on? A. Well, there isn't enough left of the Charles Gordon, Incorporated, records so that any search could be made.

Q. What has become of it? A. Well, they were destroyed when the Production Machine Tool Company was organized to carry on the production and sale of the cam lathe.

(2285) Q. Have you any independent recollection of about how long following the invoicing of the International Harvester Company machine that it was paid for? A. It was my understanding and belief that that machine was paid for about 60 days after it was invoiced. That was my recollection of it.

Q. Have you been able to verify it in any way? A. I have.

Q. And, how was that? A. I personally went to the International Harvester Company and—

Q. (Interposing): When did you go to the International Harvester Company? A. I went to their general offices on February 24.

Q. This year? A. 1939, yes, sir, and I got in touch with Mr. N. Y. Leslie who, I was informed, was in charge of the disbursement division of the accounting department. And, I inquired from him if he could advise me as to when that invoice was paid, and after he had, or his assistants—whoever it was—had made a search, they advised him, and he advised me, that the invoice was approved for payment on April 16th, 1920, and that the payment would actually be made by check within 48 hours after the invoice had been approved by his department. That was as near as he could advise me, and that is really all I know about it.

Q. Did you have any papers with you that you gave or showed Mr. Leslie at the time you made inquiry about it? A. Yes, sir.

(2286) Q. What did you have with you? These records (indicating)? A. I had some photostats, and these are the photostats here, Exhibits 308, 309, 306 and No. 2 sheet of 306.

Q. And, did Mr. Leslie make his search of the records based upon the information contained in these exhibits? A. Yes, sir. I gave him these photostats and asked him if he could find out when that payment was made, and he advised me a payment was made in the amount of $5300, authorized by his department on April 16th, 1920.

Q. Did you make any notation of your talk with Mr. Leslie? A. Yes, sir.

Q. I wish you would check and make sure whether this April date you have given is correct or not? A. (Examining document): My note calls for the payment having been authorized April 21, 1920.

Q. Then, in your testimony here where you have said April 16, you meant April 21? A. April 21. I don't know where I got that April 16. April 21.

Q. Do these exhibits that you showed Mr. Leslie anywhere show the amount of the invoice as $5300? A. Yes, sir. The invoice dated here 2/16/20, that is where I got the "16"; 2/16/20, invoice $5300.

Q. That was Charles Gordon, Incorporated, invoice? A. Yes, sir.

Q. And, it was that invoice that Mr. Leslie informed you had been approved for payment April 21, 1920? A. April 21, 1920.

Q. Did the machine carry a guarantee with it? A. Yes, sir. It was sold with a guarantee of a certain production, **(2287)** and to be of first-class material and workmanship, and so on.

Q. And, if the machine had been faulty or inoperative—

Mr. Farley (Interposing): It sounds like it is going to be rather leading.

Q. (Continuing): —would the International Harvester Company have been under any obligation to pay for it?

Mr. Farley: I object to that as leading, your Honor please.

A. No, sir.

The Master: I will overrule the objection.

A. Mr. Leslie advised me if the machine had not been approved by the superintendent of the plant where it was located, he never would have authorized payment, or his department never would have authorized payment. I believe that is the expression he used, and he said that was a rule of their department. They had to get the approval of the superintendent of the plant where the machine was in operation before they would authorize payment.

Mr. Farley: It seems to me we are going rather afield here, if the Court please. Of course, that is obviously hearsay. I don't think it is important; I will let it ride.

The Master: I think it is hearsay, but the same thing was testified to by the witnesses at the International Harvester themselves.

Q. (By Mr. Michael, continuing): What was the practice of Charles Gordon, Incorporated, with reference to invoicing a machine of this kind? A. Well, as soon as the machine was shipped, usually the day the **(2288)** machine was completed ready for shipment, the bookkeeper would be notified, and he would invoice it, and the machines were usually shipped at that time.

Q. Well, would the invoice in any case have been rendered before the machine was shipped? A. No, sir.

Q. Mr. Gordon, outline briefly the commercial record of manufacture, sale and use of the Gordon machines.

* * * * *

A. I checked up recently my memory, and any information I could **(2289)** gather as to the number of machines that we built—

Mr. Farley (Interposing): If your Honor please, may I ask that you ask the witness, or instruct the witness, to limit his testimony to cam shaft machines. The Gordon Company, by his testimony in the case before Judge Tuttle, and the other case, sold, as I understand it, many more crank cheek turning machines than cam turning machines. I don't think the record should be burdened with crank cheek machines.

The Witness: That isn't true. We sold many more crank shaft machines than crank cheek machines.

The Master: Whatever it is, I think you should be limited to the crank shaft machines. We aren't interested in any others.

The Witness: I believe a total of 27 crank shaft machines—

Q. (By Mr. Michael, interposing): Well, have you a memo you have prepared from actual records to show the number of machines you have sold of the Gordon cam turning lathe? A. I have a list here.

Q. Isn't it true that that list was made from actual records? A. Yes, they were made—the entire list was made from actual records.

Mr. Farley: Was the list prepared by you from those records?

A. This list was; yes.

Mr. Farley: All right.

The Witness: Yes.

Q. (By Mr. Michael, continuing): Tell what it shows. A. It shows on the list of cam machines that two were sold to **(2290)** Nash Motors; one to the Muskegon Motor Specialty Company; two to the Maxwell Motors; one to the International Harvester Company; two to the Peerless Motor Car Company; seven to the Studebaker Corporation; one to the Packard Motor Car Company; two to the Cadillac Motor Company; one to Peter Hartley; one to the Amstead Engineering Company; two to the Reo Motor Car Company; two to the Jackson Motor Shaft Company; one to the Cleveland Cam Shaft Company; and, two to the Willys Corporation; making a total of twenty-seven cam machines.

Mr. Farley: How many to Reo?

A. Two.

Mr. Farley: And, one to Cleveland?

A. One to Cleveland Cam Shaft Company.

Mr. Farley: And, Willys?

A. Two.

Mr. Farley: What was the third one, please?

A. Maxwell Motors.

Mr. Farley: Two or one?

A. Two.

The Master: Do you know how many of those machines are being operated today?

A. I do not. I haven't been in touch with the machines for quite a number of years.

The Master: Are you familiar with the shape of the cams that were turned on these machines that were sold?

A. In a general way. I haven't any drawings of them, and I have no recollection, definite recollection, of the shapes of the different concerns.

(2291) The Master: You had to know at the time in order to design the master cam properly, did you not?

A. Well, some of them did in our organization. I wasn't doing all of the work. I had this Mr. Litchfield that I spoke about, he was the draftsman, and my son also; he did some of the work. And, I was engaged in other lines of business as well as that.

The Master: Do you know whether any of the cams that were to be turned on these machines were sharp-nosed cams similar to the shape to that on the Ford cam shaft, or were they the blunt-nose type, such as the Nash cam shaft we have in evidence?

A. The only one I can definitely say was similar to the Ford was the Jackson Motor Shaft Company where they turned a Ford tractor shaft. I wouldn't be able to tell you of any others. But, that I happen to know because I went over and saw it in operation, and that was where I met Mr. Melling in connection with his machine. That is what makes me remember so distinctly as to having been over there. There were other things that also came up, that I protested to the Jackson Motor Shaft as to the department in which these machines were operating.

Q. (By Mr. Michael, continuing): How many machines did you sell to the Jackson Motor Shaft Company? A. Two machines.

Q. And, do you remember what the first machine sold to them was set up to turn? A. The Ford tractor shaft.

Q. The F shaft involved in this lawsuit? **(2292)** A. The F shaft, yes. As I remember, it was the same shape as it is today.

Q. And, did you on your visits over there see the machine? A. Yes, sir.

Q. Your machine? A. Yes, sir.

Q. Working on those visits? A. I did; yes, sir.

Q. Was it in regular production? A. It was operating and turning shafts. I presume it was in regular production.

Q. Did you see the shafts being turned on it? A. I did.

Q. Were they usable shafts? A. Yes, sir. I understood they were using them. They didn't tell me they were not using them.

Q. Do you know how long they used the machine on the Fordson tractor shaft? A. No, I do not know how long.

Q. Did they buy a second machine? A. Yes, sir.

Q. Of yours? A. Yes, sir.

Q. What did they use that on? A. The Lycoming Motor Company shaft.

Q. Do you remember the shape of the cams? A. No, I do not. I don't think—as I remember, it was a 12 cam shaft.

The Master: About how many different days were you in **(2293)** the Jackson Motor Shaft Company watching the operation of your machine?

A. I think I was only there the one day.

The Master: Were there any statements made by those in charge of the operation of the machine at the plant with regard to its efficiency in cutting the Ford cams?

A. The complaint that was made to me when I went over there was that the rollers on the rocker arm, and the rollers at the lower end of the arm that operated against

the form cam stuck on the pins, the supporting pins, and I protested quite strongly because they had the machine in the department where it was, that department being the rough-grinding, cam rough-grinding department, and the emery was just covered all over every machine, and we had not designed the machine with protection against any such condition as that. That was never supposed to be operated alongside of grinding machines. Therefore, there was no provision made for protecting them against this emery that was laying around there. Every machine in the department was pretty well smeared with emery.

The Master: Did they move the machine from that department when you brought that to their attention?

A. From that department?

The Master: Yes.

A. Not that I know of.

The Master: How long after you were there did they purchase the second machine for the Lycoming cam shafts?

A. I think the second machine was purchased at the same time as the first one. My recollection was that both those machines, **(2294)** the order covered those two machines.

Q. (By Mr. Michael, continuing): Were they delivered at the same time? A. I would say they wouldn't be delivered at the same time, because they were for two different shafts, and we certainly would ship the first one that we had ready for shipment.

The Master: Did you see this Lycoming machine there when you were there?

A. I haven't any real recollection of whether it was in at that time or not.

The Master: Do you recall whether there were any complaints about that machine?

A. No, sir, I never heard of a complaint about that machine.

Q. (By Mr. Michael, continuing): Did you examine your machine when you were there to see what effect, if

any, this emery dust was having on the machine? A. Yes, sir, I stated to the customer very positively that it was injurious to the machine, and that it was due to that emery that some of the parts were not performing the way that they should.

Q. Just how would this emery dust have a detrimental effect on any parts of the machine? A. Any dust abrasive of that kind would get into any of the bearings, either rotating bearings, or sliding, or anything there. It was almost an impossibility for the dust not to get into the bearings and the slides in that condition.

Q. Were all of the machines that you have listed here for us as being sold by your company paid for? **(2295)** A. Yes, sir. No—wait a minute. Yes, sir, every one of those 27 machines were paid for in full.

Q. Did you have any complaints from any of the purchasers or users of those machines? A. We had complaints from the Nash Motors Company on the first machine.

Q. What did you do about that? A. We replaced that with a brand-new machine. We recognized that machine was the experimental machine.

Q. The first one? A. The first one, and we replaced the entire machine.

Q. Did you have any complaints from them after that? A. We had men down there two or three times after that. After they had run the machine for a year, a season, they asked us to have a man go down there and check it over, and we made some—renewed some parts for them; but, later on they invited us to make a proposition for a third machine, and we had to compete with the Melling people on price, and we didn't get the order.

Q. I think you have listed there a total of what? 27 machines? A. 27 machines.

Q. Out of that 27, as I understood your testimony, you had complaints only from Nash as to the first experimental machine, and this further complaint that you just mentioned about Jackson Motor Shaft Company, is that right? A. That is correct.

Q. There were no others? A. I don't recollect any other complaints.

The Master: Didn't you previously state you had some **(2296)** difficulty with Reo with your machine?

A. Yes. But, that was all—they complained the machine would not cut off the amount of stock that was left on the stock, but that was so unreasonable that they practically voluntarily bought a second machine to take two cuts off that material instead of one. That was as much as 5/16 of an inch to remove, and, of course, the machine wouldn't do that. It was not built for that.

Q. (By Mr. Michael, continuing): You mean the forging was 5/16 of an inch oversize? A. Yes, we had that much to remove, and that was more than the cutters, or anything else, could do. That wasn't a complaint of the machine. With a reasonable amount of stock to remove, it would do it. Half of that would have been away beyond, for instance, what the Ford Company leave on their shafts.

Q. Did any of the users of your machines purchase second machines substantial periods of time after they bought the first one? A. Yes, sir. The Studebaker Corporation bought one machine, and they followed along with orders over a period of, I think—I don't know—it seems as though as I was always selling them the machines, either the cam machines, or crank machines, and that ran along over a period, I would say, over two or three years. They bought a total of 7 cam machines.

Q. And, did any of the other companies order second machines after they had the first machine? A. Yes, sir. The Reo Company ordered a second machine. I think that must have been a year after they ordered the first one. It might have been more.

Q. That was for taking the second cut, was it? (2297) A. No, sir. That was a different type of shaft. That is a different form; it was for a different shaft. Just what the detail of the difference was, I don't remember, but we fitted that machine up to turn the cams on a different shaft than what the first one was.

Q. Did they ever buy a second machine just to take a second cut? A. No, sir.

Q. What did they do about that? A. You are speaking about the Peerless now?

Q. No, Reo. You mentioned Reo buying a second machine after they bought the first. A. I was mistaken.

Q. Did Reo buy a second machine? A. Reo bought a second machine.

Q. Did they buy it to take a second cut? A. Yes, sir.

Q. What other companies bought second machines? A. The Peerless.

Q. Some time after they had the first? A. Yes, I would say it was at least a year, and possibly further. It was a new type of motor that they brought out, and required another machine, and they placed the order with us. We furnished it, and it was paid for.

Q. And, Studebaker did the same thing? A. Yes, sir.

Q. And, also, the Nash Company? A. The Nash Company. They bought for the Kenosha first, and the second one they bought for the Milwaukee plant.

Q. And, any other companies? **(2298)** A. No. The others that bought more than one machine placed the order for both of them at the one time.

Q. Do you know of your own personal knowledge whether or not all of these 27 machines went into actual production? A. No, I am quite sure that some of them didn't.

Q. Well, which ones didn't? A. The Willys Corporation, I think that was the name of the company, at Elizabeth, New Jersey, they never got operating. Their plant was—well, I don't know how—I think they went into the hands of the receiver before they even got operating.

The Master: Is that W-i-l-l-i-s?

A. "y-s."

The Master: "y-s."

Q. (By Mr. Michael, continuing): How about the other companies? A. The Cleveland Cam Shaft Machine, I never knew whether that got into production or not. I think it is very doubtful, because I never heard of them producing cam shafts to any extent. They never amounted to anything in the commercial field of making cam shafts.

Q. Well, you know about all the rest? A. Well, I didn't see them in actual production, because I didn't go to their plants at all, but—

Q. (Interposing): You didn't go to any of these plants? A. Yes. I was talking about the rest of them on this list, other than the ones I just mentioned. The Am-

stead Engineering, I never went to their plant. I never went to the Teeter Hartley plant. I did go to the Cadillac plant, the Packard plant, the Studebaker and the Peerless, and the Nash Motors, and the Reo, the Jackson; those are the plants I individually (2299) or personally visited.

Q. After your machines had been bought and installed in the plants? A. Yes, sir.

Q. And— A. (Interrupting): They were in operation.

Q. Were the machines in actual production? A. Yes, sir.

Q. And, you saw them and observed them in actual production in those plants? A. I did, yes, sir.

Q. Then, did the machines that you observed during these trips to these various plants perform in a satisfactory manner? A. Yes.

Mr. Farley: Well, that is leading, if your Honor please.

The Master: I don't think it is leading. It is a direct issue. It is in question here. I will overrule the objection.

Q. (By Mr. Michael, continuing): What was your answer? A. Yes, sir.

Q. And, can you give from your own knowledge the commercial history of these various machines; generally, the extent of the production turned out on them, just very roughly? A. Well, I don't know how many years they were in the Nash Company, in both the Kenosha and Milwaukee plants, but for a number of years they took care of their entire production of shafts required in those two plants. The Peerless Company, their entire production was taken care of by first one machine, and then when they required a different shaft, the entire (2300) production was taken care of by the second machine.

The Studebaker Company, I was very familiar with them, because I was in touch with them all the time selling other equipment, and they had seven machines, and they turned all of their production with those seven machines, and that was a very large production those days.

Cadillac Motor Company, they turned all of their production.

The others I am not so familiar with as to how much production they had, or whether they did all of their production on those machines. They might have had a different type of shaft than what the machine was equipped for, and they might have formed some of the cams on the shafts by some other means. If their production was small, they possibly would, instead of buying a new big production machine.

Mr. Farley: I move that be stricken, your Honor please, it is purely speculative.

The Master: Well, the witness is simply stating the limits of his knowledge with respect to that production there. I will let it stand.

Q. (By Mr. Michael, continuing): Aside, Mr. Gordon, from whether or not these machines in these various plants turned all or part of the production of the plants, what, roughly, would you estimate was the volume of the production on all your machines during all the period they operated? A. Well, I wouldn't attempt to estimate on number, other than to say there were millions of cams turned by our machines; many millions.

Q. In regular commercial production? **(2301)** A. In regular commercial production.

Q. What was the approximate price of all of your cam lathes? A. Anywheres from 4,000 to 5500 dollars, dependent on the equipment that was—the special equipment furnished with the machines, and the number of cams on the shafts to be turned.

* * * * *

(2378) Re-Cross Examination by Mr. Farley.

Q. Mr. Gordon, I believe you testified that the machine of yours which was sent to the International Harvester Company was guaranteed to be of first-class workmanship and material? A. Yes, sir.

Q. And that machine, I assume, was of first-class workmanship and material? A. I believe it was.

Q. I also understand your testimony to be that you know nothing about the difficulties they had with that machine at the International Harvester? A. Outside of what I believe I testified to in regard to an eccentric cam.

Q. You testified, I believe, when you were on the stand before, that you had endeavored to find out about the machine at International Harvester, but you could never get any information concerning it? A. I inquired about all the machines that we had out at all times, whenever I got an opportunity to get in touch with anybody, where the machine was located.

Q. Well, you did so testify before the Master here, that you had **(2379)** never been able to find out anything about the machine at the International Harvester Company? A. I do not just remember it; probably I did, if you have it there and would read that testimony I probably would remember it.

Q. At page 75 of the record I asked you the question: "Now, you had a similar experience with your machine in the plant of the International Harvester Company, did you not?" And your answer was: "I hadn't anything whatever to do with the machine that went to the International Harvester Company, other than to know that one was sent there, and of course my business was not restricted to the cam machines, and I was very busy on other things, and finally I started an inquiry as to what happened to those machines, or that one. I do not remember there was more than one machine." And at page 174 of the record, you testified, in answer to my question appearing at the bottom of page 173: "And didn't you have the same sort of difficulty with your machine at the International Harvester?" And you testified: "I never saw the machine at the International Harvester, and could not get any information from the International Harvester Company people. I probably could have." I understand your testimony to have been that your son was sent to the International Harvester Company to help them out of their difficulties? A. I do not believe I ever testified to that effect. I might have, but I don't remember it.

Q. Didn't you say that on your direct examination? A. I thought I testified he was sent there to demonstrate the machine.

(2380) The Master: I think that is what he testified to.

Q. (By Mr. Farley): Well, can you state whether or not you ever sent anyone, or anyone was ever sent by

the Gordon Form Lathe Company, to help the International Harvester Company with their difficulties with the Gordon machine? A. I don't know of anyone ever having gone to the Harvester Company in reference to any difficulties in connection with the machine after the machine was demonstrated and accepted by the International Harvester Company.

Q. I think you testified that you had read the testimony of the witnesses whom we examined in Chicago concerning the International Harvester machines? A. I did read their testimony, yes, sir.

Q. And would it be your testimony that those men were mistaken when they said that someone from your company came and helped to try to make the machine work and couldn't do it? A. As far as I know, they were mistaken. I don't know of anything; they might not have been mistaken, but I think they were.

Q. Well, didn't you make it a practice of a concern having difficulty with your machines to send someone in and try to remedy the complaints? A. Yes, sir, if we were notified that they were in trouble with the machines, we always sent a man down there to correct it wherever it might be.

Q. Well, any difficulties the International Harvester Company may have had with the machine would not have been on account of any poor workmanship or material in the machine; that would be true, wouldn't it? **(2381)** A. I think it would, unless an accident happened to the machine, and of that, I don't know.

Q. Now, on your direct examination you testified about a number of machines that—Gordon machines—that were sold to various concerns, and if I recall your testimony, you said you had gone to the Peerless plant to see the machines in operation there. You mentioned a number of plants, Peerless, I think you said you saw the machines operating, at Nash, Peerless, Studebaker, Packard, Cadillac, and Reo; is that in accordance with your recollection? A. That is correct, yes, sir.

Q. Who did you contact at the Peerless plant, do you recall? A. No, I don't.

Q. How about Studebaker, who did you contact there? A. Well, I contacted one party at the South Bend plant, I contacted quite frequently.

Q. Who was that, please? A. I cannot remember his name, but he was a man who testified in one of the cases that we had here.

Q. Cheney? A. Cheney, George Cheney, that was his name, yes.

Q. He is a personal friend of yours, isn't he? A. Well, he was a man who worked for me at one time, that is, if I remember right, I hired him, but I never knew him before the time I hired him, and I never contacted him outside of the plant organization.

Q. Who did you contact at Packard, do you recall? A. No, I don't remember who I contacted in reference to the cam **(2382)** machine. I contacted their engineers on the cam shaft machine when they tried to change that machine over from one type of crank shaft to another.

Q. How about Cadillac, do you remember who you contacted there? A. No, I don't think—the foreman of the department, I don't remember what his name was.

Q. How about Reo, do you remember who you contacted there? A. The general superintendent, I don't just remember what his name was; if I heard it I think I would remember it; Mr. Thiel.

Q. Mr. Teal—"T-e-a-l"? A. No, I don't think it was, I think it was "T-h-e-i-l," or, "T-h-i-e-l"; I contacted him, and a number of other people that were in the plant, foremen, sub-foremen, and so on.

Q. Just when was it you made your visit to these particular places? A. When was it?

Q. Yes. A. Well, I have no memory as to when it was, it is a long time ago. I would generally call on these people when I was in their vicinity, if there was any occasion for doing that; I was travelling in Michigan, Illinois, Indiana, Wisconsin, Iowa, selling other types of machinery.

Q. Do you remember what year it was, would it have been 1924 or 1922 or 1920, or how long after you sold the machine, do you recall? A. Well, I could tell you that in connection with the different companies, probably, I couldn't tell you when it was, but I **(2383)** could tell you how close it was to the time we put the machine in operation.

Q. Just when was it that you worked for Studebaker? A. Well, I can't tell you the date of that, but I can tell you

some of the circumstances in connection with it; it was at the time that Walter Flanders quit the organization and the Studebaker took the organization over from the E. M. F. Company; just what those dates are I don't pretend to remember.

Q. That was some time before you sold any machines to Studebaker, wasn't it? A. Oh, that was years before we ever thought of the machine.

Q. That is what I thought. A. Yes.

Q. Now, you were asked by the Court if you knew how many of the Gordon machines were in operation today, and you said you didn't know. As a matter of fact, you don't know of any place where any machine is in operation, do you? A. I don't, no, sir.

Q. When did you last see a Gordon machine in operation? A. Well, it is a number of years ago; I wouldn't attempt to say when that time was.

Q. What is the last Gordon machine you saw in operation; the one at the Ford plant? A. You are right, that is correct, I haven't seen one in operation since then.

Q. Now, you testified that you saw a Gordon machine operating in regular production at the plant of the Jackson Motor Shaft Company, did you not? **(2384)** A. I did, yes, sir.

Q. Did you read the testimony of the witnesses Otto H. Schultz, Bert Weisel and Frank Steinke, in the interference record before you testified here yesterday? A. If I did, it is a long while ago that I read it, but I remember those individuals testifying. I was there when they did testify; that is, I don't know of any action that was taken that I did not attend.

Q. Do you recall that Mr. Schultz testified, as appears on page 105 of this record, with respect to the Gordon machine: "We did everything we knew how to make those machines work before we took the matter up with Mr. Gordon, and he then sent in Mr. Goddard, and we turned over the tool room and gave him a man and told him to stay right with him and help him make those machines work," and the question was asked: "Do I understand the first machine never did work? A. The first machine worked and run cam shafts, but the class of work obtained from the machine that came off the machine was so bad we had

to take it off the machine and go back to the method of rough grinding, for the cost on the job of scrap was so high we could not afford to run the machine on the job." Then he was asked: "You are now speaking of the first machine? A. Yes. Q. The one Mr. Gordon's son tried to operate? A. Mr. Gordon's son gave up the job. I think he came back with the second machine the second time, that is, Mr. Gordon's son, the second machine I think he came back for a short time, he was sent, I think, some place else, and I think there was another mechanic Mr. Gordon sent in the meantime; I don't remember his **(2385)** name. Q. Speaking of the first machine that was on the Ford cam shaft? A. Yes." As a matter of fact, didn't each and every one of those three witnesses testify that they never succeeded in getting any satisfactory shafts off the Gordon machine when they attempted to operate it to cut Ford cam shafts?

Mr. Spohn: Now, if your Honor please, I appreciate the fact this is cross examination, but it does not seem that the question to the witness as to whether those witnesses did not testify so and so is correct cross examination. He may not agree with the witnesses. He has the testimony right there.

The Master: Yes, it will speak for itself.

Q. (By Mr. Farley): Well, you did not review that testimony before you testified here yesterday, that is my understanding, that is true, isn't it? A. No, sir, I did not. I do not know how many years ago it was I saw that testimony.

Q. And your testimony was that you were at the Jackson plant just for one day, and as I understood your testimony you went there, did you not, because of the complaint that was made about the machine; that was the purpose of your being there? A. We were having machines made here in Detroit, and I don't remember whether it was on the way to Detroit to see about more machines, or just what the circumstances were that made me stop over there. I don't remember whether it was prior to the time that I had men go there to take care of any trouble that they were experiencing, or whether it was after I had men on the job.

Q. Well, you knew they were having trouble with the machine? **(2386)** A. I knew they were not satisfied with the machines, yes, sir.

Q. And wasn't that really the purpose of your visit there? A. It possibly was; I am not sure whether that was before or after we had men there.

Q. When you visited the Peerless and the Studebaker and these other plants, isn't it a fact that the reason for your call was because of complaints made about the machines? A. It positively was not.

Q. Now, you testified that the Jackson Company was the only one that you could recall where they were attempting to turn the sharp-nosed cams, as I understand your testimony; that was your testimony, wasn't it? A. I think it was.

Q. Did you ever check on the proposition at Studebaker as to the performance of your machines there? A. Yes, sir.

Q. The Studebaker had a very broad nose cam, did they not? A. I don't think it was exceptionally broad nose.

Q. It was quite similar to the Nash cam, wasn't it? A. I don't think so. My memory of it is, I haven't seen one for a long while, but—

Q. (Interposing): Did you ever see them operating your machines at the Studebaker plant, one machine taking a rough cut, one Gordon machine taking a rough cut, and another machine taking a finishing cut? A. I have.

Q. As a matter of fact, the output of those machines was 14 shafts an hour, was it not, on the roughing cut, and 14 an hour on the **(2387)** finishing cut? A. No, sir, it certainly was not; that is, that was not the limit of the production.

Q. I think I asked you once before as to all of these machines which you testified were sold by the Gordon Company; how many machines was it, 23, wasn't it? A. 27, if I remember right.

Q. 27. Each and every one of those machines was sold outright by you, were they not? A. They were.

Q. And in no case did you make it a practice to attempt to get so much per shaft for each shaft turned on the machines?

Mr. Spohn: If your Honor please, I do not think that question is relevant and material to this issue here.

Mr. Farley: I think it is decidedly material.

The Master: I will listen to the answer.

A. No, sir, at no time.

* * * * *

(2452) The Master: Mr. Gordon, you were here through all, practically all of the testimony submitted by the defendant with regard to mechanical matters; I think the only time you left was when the accounting questions were being taken up?

A. I believe I was here all the time.

The Master: You heard all of the testimony with regard to the straightening operation which is claimed to have been required on the Walcott machine, but not on the shaper?

A. Yes, sir.

The Master: Do you as a mechanic have any opinion upon that issue?

A. Yes, sir, I have.

The Master: What is it?

A. The same requirement for straightening operation would exist in any kind of a machine that was going to form the contour of the cams. I might state, and I think I testified to that effect, that when I went to the Ford Company on the demonstration of the Gordon cam lathe, we found that the centers in the ends of the shaft were very poor shaped. By that I would like to illustrate—let me have one of those shafts.

Mr. Farley: There are plenty of shafts there (indicating).

A. I am talking about this shaft; I do not know what the others might be; I have looked at this.

Mr. Michael: Which one are you referring to?

A. The center in that cam shaft, Exhibit AAA, would be considered a very proper center, that is it is ample size, has plenty of clearance with the tip of the center with the hole that is **(2453)** drilled at the bottom, and it is smooth, it hasn't been torn or ragged or anything, it is a real good

bearing for a center. Now, the angle of the centers in the shaft that we received to make our demonstration on the Gordon, sometimes the bearings, or the center would bear down near the bottom, sometimes it would bear near the top, sometimes the centers had been worn until they were grooved like that (indicating), and they would not fit, but in spots around, different places in that center. Now, these centers were in splendid condition, the shaft was in excellent condition as regards running true, good centers and accuracy in the shape of the bearing, the center bearing. Now, that shaft in that condition is the best that can be obtained generally for the succeeding operations. You have got to prepare your shaft directly for them. Now, if that shaft had been bent, which was a condition in the shafts that we had, not only was it bent but the bearing varied in size. Some of the shafts had bearings we could not get in our steady rest, they were so large. Others were so small that there was nothing to hold the shaft except within the limit of the error in the diameter, so that the work of turning the cams would permit the shaft to spring back and forth and the steady rest really wasn't acting as a steady rest to the full extent.

Now, if you had a shaft that was bent and it was walking around, or floating around in a steady rest that did not fit the job, then from pressure of the tool, speaking of the Ford shaper, the pressure of the tool tended to push that down, spring it down, if it was capable of doing it. On the T **(2454)** shaft that might have been possible, but the A shaft it is very doubtful, but it might spring the T shaft down so that that always pushed down to the bottom, or in that proximity. That is, if the support was a half circle and if the shaft was smaller it would push it down to the bottom, as I show in that sketch, and it might float sideways some because it was loose here and loose here (indicating).

The Master: On each side?

A. On each side, but the pressure of the tools might push it down here (indicating), but when it was free and there was no load on, cutting tool load, it would spring up away from the bottom as well, and it would just simply—the center of the shaft would travel around in a circle.

Now, apparently they were satisfied with that condition in the T shaft, but with the improvement demanded in

the production of these parts, I do not think there is any doubt but that that would have been a proper operation to have the shaft straight when it went into the machine in the first place, regardless of the type of machine. A machine for turning the cams is not supposed to be a straightening machine, and that is what they demand, when they put a piece of work in a machine of that kind and demand that that spring it to a different contour than it was before, while they are performing that operation.

The Master: Of course the Walcott machines were used first on the Model T shafts, and according to most of the testimony in the record the straightening operation was added at the time the Model T shafts were being turned?

(2455) A. My judgment is, as a mechanic who has handled this work for a long while, that it was a very crude way of doing the work even before that. The shaft should have been straightened regardless of the machine. There is no more occasion of straightening it in one machine than there was for straightening it in another machine.

The Master: Well, you say there is some difference between the two machines because of the fact that the shaper does tend to correct any springing of the shaft, at least while the operation is being performed?

A. I do not admit that; I say that might be possible, but I doubt it very much. Unless the tools are very, very dull, they would not press that shaft down. If those tools were sharp and the amount of metal—now, as I remember in the testimony it was testified that they took two cuts on this work. Now, what happens during the first cut is immaterial, but the amount of metal that is left on for the second cut is a very small amount, so that unless the tool was very very dull, way outside of reason, taking that light second cut, and that is the one that registers, it would not spring that work down in the shaper. In other words, the cams would not be concentric with the bearings.

The Master: You think further even if the shaper did correct the springing on the Model T shaft, that it would not have done so when used on the Model A?

A. Because of the greater stiffness of the shaft.

The Master: Because of the greater stiffness of the shaft?

(2456) A. That is true. In the small amount of the cut, that is the second cut on the shaper, it would mean that the pressure applied to take that light cut was almost negligible, with a reasonably sharp tool.

The Master: There is another thing I wanted to ask you. There was considerable testimony by witnesses for the defendant, with your machine used on the Ford shaft with the pointed nose, that as the tool turned around the point of the nose it required a very large swing of the tool and that that was the principal difficulty, as I understood it, that the Ford Company experienced with your machine. I think Mr. Brush testified that if you had an absolutely sharp pointed cam, without any arc whatsoever in the nose, that the tool would have to swing around in an infinitely short time, and it would be impossible to cut such a cam on your machine.

A. It would depend, of course, on included angle at the top of the cam. I do not know whether you understand what I mean or not. However, we will consider that (indicating) is the point of the cam, and it is a sharp edge. The included angle here makes that comparatively easy. Now, I say a sharp edge, that is a sharp edge also (indicating), although the included angle is much greater, so that we have got to swing from this point around to this point (indicating). On the cam that was as sharp as that, you have to swing from here all the way around there, and a knife edge on the top of that cam would reduce the time in which you could go around there. That is perfectly true, and the rounder, the nearer you get to a cylinder the easier it is, until you get to the cylinder where **(2457)** you have no rocking movement at all, and you get a knife edge, a very sharp knife edge with a very small included angle between the sides of the nose you get to a point where you could not go around in the Gordon construction, but that is not the type of cams that are used.

Now, we did turn, I don't know how many, I won't attempt to say how many, but we did turn a great many cams of the Ford shaft. They speak about what you have

got to do, how fast you have got to travel to get around here. It came out very distinctly I think before the other court that you have a condition such as this, for instance in the Melling machine you have a cam down here, suppose you had that, that is one position of it, and here is the other position of it. You start here and you swing from this point way round up here, you haven't any time to do that if that is a straight line, you cannot cover that all in no time at all, and that is what you have got in a Melling machine; there is a fault in pretty near anything, you cannot make everything universal. Those are conditions that are not met with in regular practice. We could, if it was required to do that, we could make special equipment to do that. There is no real trouble to accomplish that, but you are making a practical marketable machine that is to be used universally in the industry.

The Master: You agree then that if the cam is sufficiently pointed that your machine would not effectively cut it, but you disagree that the Ford cam was pointed to that extent.

A. That is correct, yes, sir, because we have turned many of them.

Mr. Farley: Ford cams.

(2458) A. The Ford cam, yes, sir, and it was so testified by those who did turn them.

Mr. Farley: By whom?

A. By the—

Mr. Farley: Mr. Herklotz?

A. By the witnesses that were mentioned here yesterday I believe by yourself. I do not remember what their names are.

Mr. Farley: I will just ask the Court at his convenience to read the testimony of those witnesses.

The Master: Yes, I intended to do that.

A. My memory is that they testified that they had a scrap loss of 20 to 25 per cent; I am quite sure that that was what they testified. Now, if they had a scrap loss of 20 to 25 per cent, what they meant was that the shafts were not correctly formed; it does not mean that they had to

throw the shaft away; it might take another operation and corrected the shaft, but as it went from that machine 20 to 25 per cent of them were defective. That was the testimony, as I remember it.

Now, I know that they turned them, they used them for months and that must have meant that there still were a lot of them that were correct.

Now, there are a lot of reasons why they were defective and they cannot all be placed against the machine. That is done regardless of what type of machine. There are no machines made where every one of them go through and meet all conditions perfectly satisfactory. Machines that have been produced by some of our best manufacturers, Pratt & Whitney Company, for instance, I remember very distinctly we sent two lathes back to them. Pratt & Whitney are one of the **(2459)** leading machine tool manufacturers in the world, and those lathes were very defective. The third one we got was perfectly satisfactory. Kearney & Trector, of Milwaukee, the first milling machine we bought from them we could not keep that, we had to send it back; that is to be expected. I might say the same thing about a Ford automobile, some of them are good and some of them are not so good. I have heard of that, I have never owned one, but I have heard it said.

* * * * *

Todd L. Moise was thereupon recalled as a witness herein, and having been previously duly sworn, testified further as follows:

Re-Direct Examination by Mr. Spohn.

Q. You are the same Todd L. Moise who has testified heretofore in these proceedings? A. Yes.

Q. And have you attended every hearing in this accounting matter except, as I remember you testified, you were not here one-half day, and you were not present when these depositions, or the testimony was taken in Rockford or Chicago, is that correct? **(2460)** A. That is correct.

Q. Have you read over that testimony? A. I have.

Q. Now, when you were present at these hearings did you hear and observe the witnesses? A. Yes.

Q. And have you analyzed the testimony and exhibits offered in these accounting proceedings? A. I have, carefully.

Q. Did you read the parts of the printed transcript of the trial before Judge Tuttle in so far as it affected accounting matters? A. I did, I think I read all of it that related to accounting matters; I tried to.

Q. And you state you have analyzed the exhibits that have been offered in this hearing which related to accounting matters? A. Yes, sir.

Q. Have you seen the defendant exhibits, statements of account, Exhibits A, B and C? A. Yes, sir.

Q. Did you analyze Defendant's Exhibit C-1? A. I did.

Q. Have you analyzed Defendant's Exhibit 301? A. I did.

Q. Did you examine Defendant's Exhibit 302, another report that had substituted pages for your report? A. I did.

Q. Were you present at the defendant's plant when there was a demonstration made of the Ford Westinghouse machine and the **(2461)** Melling machines? A. I was present, yes.

Q. And were you present when the inspection was made of track 297 in Defendant's plant? A. Yes, I was.

Q. Now, you have filed in this matter, the record shows, Exhibits Z, Z-1, and Z-2? A. Yes, sir.

Q. As a result of the evidence taken in this hearing, have you revised your reports heretofore filed? A. Yes, I have revised the reports.

Q. And since the adjournment on February 4th, when the defendant finished the case, other than for the taking of the testimony in Chicago and Rockford, have you made a final report? A. I have made a final report and I have it with me.

Q. Will you produce that report? A. Here are six copies. I will make sure this is the right one.

Mr. Spohn: I ask that that report which the witness has just handed me be marked for identification as Exhibit Z-3.

* * * * *

Q. This report, which has just been marked for identification as Exhibit Z-3, on page 1 shows a total profit of $959,696.88? A. That is correct.

Q. What is the period covered by this report, the period of time, Mr. Moise? A. From June 16, 1925, to March 15, 1931, inclusive.

(2462) Q. On page 1 of your report it sets forth three different figures which go to make up this total of $959,696.88, the first of these figures is $895,793.95. What does that figure relate to? A. It relates to the minimum profits from June 16, 1925, to February 3, 1931, exclusive of the production assigned by the defendant to the Pioch machines.

Q. In the computation of that profit, what pages of your report are referable to and support that computation? A. It is supported by pages 2 to 18, inclusive, of this Exhibit Z-3.

Q. Now, the second figure on page 1 of your report is a profit of $32,629.23. What period does that cover? A. That covers the period from May 16, 1930, to February 3, 1931, and it represents the profits, gains, and so forth, on the production assigned by the defendant to the Pioch machines during that period.

Q. What pages of your report support that computation, or are referable to it? A. Pages 19 to 21, inclusive.

Q. Now, the third figure on page 1 of your report of profit, gains and advantages, is $31,273.70; what does that figure represent? A. That is from the period of February 4, 1931, to March 15, 1931, and it represents the profits, gains and savings and advantages to the end of the infringing period after the February 3rd, 1931, including the first two items.

Q. And the total profit, as I pointed out, is set forth on page 1, $959,696.88, is that right? **(2463)** A. That is the total.

Q. What have you to say with respect to this report; what did you base it upon? A. Well, that report is based upon the evidence before Judge Tuttle, and upon all of the evidence and exhibits presented in this—all of these accounting hearings.

Q. Now, you have presented three reports heretofore, as I pointed out, Exhibits Z, Z-1 and Z-2; what have you to say with respect to Exhibit Z-3; is that a complete report in itself? A. Exhibit 3 is entirely complete; where

Exhibit Z-3 duplicates Exhibits Z, Z-1 and Z-2, they are included, so that the report is complete.

Q. In other words, no reference is necessary to these prior reports? A. None whatever.

Q. Now, in the compilation of this report, Z-3, what have you to say with respect to the principles upon which this report has been computed, particularly with reference to your report Z-1? A. Why, the principles are the same, except that the calculations are modified, based upon some changes arrived at through evidence given since the preceding reports were made, since Z-1 and Z-2 were made.

* * * * *

(2471) Q. On pages 6, 7 and 8,—and I take it those three sheets all relate to the same subject matter, and that is the determination of burden ratio to productive labor, is that right? A. Yes.

Q. Will you state where you obtained those burden rates? A. I have a note so as to get the exhibits.

Q. The second line of this page 6 refers to Plaintiff's Exhibits X-1, X-2 and X-3? A. That is Exhibits X-1, X-2 —that is right; it is entered in here. I had a note, and didn't put it here. These are taken from Plaintiff's Exhibits X-1, X-2—taken from—

(2472) Q. (Interposing): And, X-3? A. Well, those were presented by defendant, were they not?

Q. They are Plaintiff's Exhibits. A. I didn't know. They were presented by defendant. Plaintiff's Exhibits X-1, X-2 and X-3 for all periods subsequent to December 31, 1925; but, as Exhibits X-1, X-2 and X-3 did not include any preceding period, the period from June 16, 1925, to December 31, 1925, is based on data obtained from cost summary cards previously presented by defendant. In other words, the special data furnished began with 1926.

Q. Is this computation as you have it on pages 6, 7 and 8 of Exhibit Z-3 comparable to like computations in Exhibit Z-1? A. It is identical.

Q. And, in that report your percentage of overhead or burden was applied to the direct labor rates? A. On an annual basis so far as possible.

Q. As far as this report is built up, what was your standard of comparison for the production of the T shafts

on the Melling machine? A. The T shaft comparison of the Melling machine was based on the Ford shapers.

Q. Ford cam shapers? A. Ford cam shapers of the type used; the actual ones used.

Q. On the production of the Melling machine on the A and F shafts? A. They are compared with Landis grinders.

Q. For both? A. For both the A and the F, the standard of comparison is Landis grinders.

Q. And, that is the same standard you used in Exhibit Z-1? A. It is.

* * * * *

(2478) Q. Mr. Moise, pages 17 and 18 of your report, will you turn to those pages. I understand those pages set forth tabulation of cost summary cards used by you in preparation of this report? A. Yes; all of the cost summaries furnished by defendant. And, this is the same as Exhibit Z-1.

Q. I understand that these cost summary cards have all been identified in your report with the same exhibit numbers as they have in this proceeding? **(2479)** A. They have.

* * * * *

(2480) Q. Now, Mr. Moise, you have testified that you are a senior member of the firm of Moise & Burgess? A. I am.

Q. Certified Public Accountants? A. Yes, sir.

Q. You have your office in Elyria, Ohio? A. Principal office in Elyria.

Q. Your principal business in your accounting, what does that consist of? A. Of course, the principal business of most accounting firms is supposed to be auditing, and, of course, that is a very big factor in ours, but we specialize in cost and financial analysis, the training of cost departments, and the preparation of data from proper cost records with the object of effecting economies and improving methods, and so increasing profit of our clients.

(2481) Q. Do you have an office in Cleveland, Ohio? A. I have an office there.

Q. How long have you been practicing public accounting work? A. About 17 years.

Q. Prior to that time what was your occupation? A. I was with the steel corporation, a subsidiary of the steel corporation, the National Tube Company, in an executive accounting and financial position.

Q. Assuming, as a matter of law, that in these proceedings, savings, gains and advantages derived from the use of these infringing machines must be determined with reference to standards of comparison, consisting of the Ford cam shaper on the T shaft production, and the Landis grinders on the A and F shaft production. Does this report, Exhibit Z-3, set forth and reflect these profits for the infringing period? A. It does.

Q. What have you to say with respect to your report? Does it contain profits which you would have an opinion as to whether they are conservative or not? A. I think they are conservative. An effort has been made to make them conservative, and not to take any factors in it which might have been used otherwise.

Q. In building up this report what have you to say with respect to the accounting principles which you followed? Are they the best accounting principles, in your opinion? A. I think they represent established and recognized accounting principles, and the best possible obtainable under the circumstances.

Mr. Spohn: I will offer Exhibit Z-3 in evidence, your **(2482)** Honor, please.

The Master: I will admit the Exhibit.

* * * * *

Q. (By Mr. Spohn, continuing): Now, Mr. Moise, you were employed in this matter as an expert accountant, and what did you understand your duties were in the preparation of your report, Exhibit Z-3? A. That and one or two other matters in connection with this are so important as to clearness of expression, and also as to brevity of expression, that I have made some notes with reference to it, which I would prefer to read.

To make a fair and impartial analysis of the defendant's accounts as filed, of all the evidence and exhibits offered in this case, and to make a report to the Master which I consider the proofs require; it is common practice for accountants to be called upon to make analyses of costs and profits, and it is not at all unusual for them to

work from data that is not at all complete. Their ability to do so and to get reasonable results acceptable to others, including the Federal tax authorities, is the result of their training and (2483) specialization in such work.

An accountant is not an advocate. It is an accountant's duty merely to set forth facts as he finds them and to use his best judgment in order to either get the facts or substitute reasonable estimates when definite facts and figures are not available.

When making a comparison between two methods of operation, the fundamental requirements in any fair comparison is that similar elements of cost, when they exist, shall be used in stating both sides of a question and it is, in my judgment, not at all good accounting practice to use the cost for a particular element or expense on one side because the figures are available and to completely ignore a corresponding expense, known to exist, because the exact cost is not available. It is always possible to secure a fair estimate of an unknown cost and use it where the exact cost is not known. Failure to do so makes the comparison utterly valueless.

Now, as to the things which an accountant in this case should, in my judgment, try to determine and those which he should leave to the attorneys; in this case the standard of comparison is based upon a question of law and not upon one of accounting. Had there been other machines actually used by the Ford Motor Company at the time of infringement for exactly the same purposes, that is, the reduction of the A shafts, then the accountant might well have entered into the question of standard of comparison, but such was not the case; and, therefore, the accountant must be guided by his attorneys on the standards of comparison used. On T shaft production, (2484) the Ford cam shaper had been actually used.

However, when it comes to a question of speeds of various machines, of the inclusion of operations and of certain expenses set forth, it is the accountant's duty to do what he customarily does in the course of his business; and, that is, to carefully analyze all evidence presented, try to weigh each piece of evidence, and form his own judgment as to these matters.

In an effort to do this, I have not only listened to the testimony throughout the hearings, in this case, but have

read very carefully the more than 3,000 pages of evidence and have also read portions of the printed record of appeal during the hearing of which I was not present. The machine speeds, the operations and inclusion of expenses on the one side or the other, are, as I have used them, the result of my considerate and careful analysis and judgment of the testimony offered.

Q. Well, now, you have testified that you had experience in cost accounting work for concerns making automobile parts? A. Oh, yes.

Q. Did you hear the testimony of Mr. Russell and Mr. Hogelan with respect to defendant's accounting records, and methods of cost finding? A. I did.

Q. What use, in your opinion, would have been detailed cost records in this case if the same had been available? A. That brings up a little question of what are meant by costs. Mr. Russell spoke some on the subject. Generally speaking, costs are found and determined for two purposes:

(2485) First, to determine actual cost so as to inform management whether a profit or loss results, and whether the particular item can be bought more cheaply than it is being produced.

But, of far greater importance, and in my experience a matter which has resulted in very large dividends to those using them, cost information, correctly derived by men trained in costs and in analysis of operations, in elements of overhead, and their relationship to direct labor, can be passed on to those supervising operations, in order that unnecessary expenditures may be curtailed to a minimum.

It is perfectly true that on an assembly, automobile assembly line, the movement of the cars being assembled or on a motor assembly line, the movement of the motors being assembled controls production, each man, or small group of men, having to do their work as the part passes them. If anything happens to the motor or the car being assembled, it is lifted bodily out, so as not to materially interrupt the work.

In the Ford cam shaft department, three days' supply of cam shafts are on the conveyors and if anything up to 22 machines are specified for a single operation, the num-

ber used can be varied anywhere from these 22 down to 2, depending upon the rate of production. Also, it is, at least theoretically, possible to get a full day behind because of machine trouble and catch up.

It will be noted that the purchases of machines by the Ford Motor Company appear to be based, even with a 20 percent allowance, on taking care of production in 16 hours or two **(2486)** shifts, whereas the plant normally, or at least frequently, runs 3 shifts. Certainly definitely comparative data showing the production of machines from time to time and the number of machines used for varying productions, would be of the utmost value in cutting out the use of unnecessary machines.

It would be absurd to continually make detailed motion time studies of each operation, but it is also true that motion time studies, used reasonably, have their place. Some men easily and naturally, and without undue fatigue, get out large production. Others get out smaller production and become exceedingly weary. Most men who work readily and smoothly and most foremen themselves, do not know just why these men are better workers than others.

I have been able to compute profits realized by the defendant as set forth in Exhibit Z-3 from all the evidence presented in this case. Were the following records now available for the whole accounting period, such computation could have been made much more easily and with less dispute between the parties:

First, time studies taken frequently enough to determine turning time or machine speed.

Second, actual production records to determine actually the shafts turned, and selling and inventory records to check up and control production records.

Third, actual production records segregating production by each type of machine during periods when more than one type of machine was available.

Fourth, total departmental overhead records and the elements going to make up this total, expressed in dollars.

(2487) Fifth, payroll data on machine operators.

Sixth, records of machine hour operations.

Seventh, tool costs. When originally purchased, repair and maintenance costs, and tool life.

Eighth, complete repairs and overhaul costs of all machines of all types.

Q. Does your report, Exhibit Z-3, charge a straightening operation to the use of the Melling cam lathe on either its production of T, A, or F shafts? A. It does not.

Q. You have heard all the testimony on the question of straightening, you testified? A. Yes.

Q. Have you considered it in Defendant's Exhibits 13 and 14 attached to Exhibit C? A. I have.

Q. Generally speaking, in your work of cost analysis and cost derivation, are you called upon to determine just what operations are attributable to various machines? A. Frequently.

Q. What are the sources of information upon which you make such determination? A. Well, records, time studies, statements of foremen, of those in executive positions, payroll data, and when the investigation is current, actual personal investigation and observation.

Q. And, then, from that data you do what? A. From that data I, with my trained judgment as an accountant, determine what should be included in the result.

Q. As an expert accountant in this case, and having heard all this (2488) testimony on the question of the straightening operation, having considered all the exhibits and all the testimony, do you have an opinion as to whether the cost of this straightening operation on shafts immediately prior to turning them on Melling cam lathes should be charged to the use of the Melling machines? A. I have such an opinion.

Q. What is your opinion? A. It should not.

Q. Why should it not? A. Well, I have gone through all of the testimony on that subject, and made 50 or 60 notes, which it is not necessary to go into now, but briefly, the straightening operation is claimed by defendant to consume a minimum of a half-minute. This is considerable time compared to the turning time on Melling machines, and is a very important factor if the operation were really required upon adoption of the use of the infringing machines.

Defendant's original statement of account, paragraphs 23 and 24, did not include a straightening operation. Its amended statement of account, Exhibit B, claimed this operation for the first time.

Exhibits 15, 16 and 17 all list straightening as preceding rough grinding center bearing. This is also true of Exhibit 214.

The only operation sheet in which straightening does not precede rough grinding of center bearing is in Exhibit 14, but this sheet may have this operation reversed, just as an operation was reversed in the immediately preceding H series.

(2489) Now, I would refer particularly, perhaps, to the evidence regarding the steady rests in the shapers: the testimony of Mr. Pioch with regard to that, in which he stated that such difference as may have existed, if it did exist between the two machines, could have been covered by additional steady rests very readily; to that by Mr. Brush, in which he stated he did not know how many rollers the steady rest had, but that 3 rollers would have prevented any requirement for straightening, and that 3 rollers were common practice long preceding the time of infringement. The fact that Mr. Achton, who was production superintendent, said they were not straightening T's in 1927. Of course, that is no proof they were not straightening them before. But, he said they were not in 1927, and that he put the operation on A because of the difference in the—primarily because of the difference in the bearing diameter and the barrel diameter of the shaft which caused, I believe, more warping and heating.

I have a lot of notes about that, because I have considered this with the greatest care, being such an important factor in here, and I can not see any possible reason why it is an element of cost that is due to the adoption of the Melling machines.

Q. The adoption of the Melling machines as such? A. As such.

* * * * *

(2494) Mr. Spohn: Shall we proceed, your Honor?
The Master: Yes.

Q. Now, Mr. Moise, in your report, Exhibit Z-3, I notice you have made an allowance of factory overhead of burden? A. Yes, I have.

Q. How is that computed? A. From data supplied by the defendant and set forth on pages 6, 7 and 8 of this Exhibit Z-3.

Q. In your opinion does your method of computing this overhead, as it is reflected in your Exhibit Z-3, conform to the best accounting practice? A. It does.

Q. Why? A. I am a little particular about this one, again. The determination as to which elements of factory burden are affected by a change in equipment and personnel and the extent to which each is so affected, must be made—

(2495) Mr. Farley (Interposing): Now, if your Honor please, I feel the witness has gone about as far as he should be permitted to go in reading these prepared statements. It seems to me it is too much like a witness reading the brief in the record. I think that question of Mr. Spohn's certainly admits of an answer without the witness reading a prepared statement.

Mr. Spohn: If your Honor please, the witness here is an expert and I assume that we could put in Exhibit Z-3, the main report, consisting of 20 pages, by going through each number and each item and showing its relationship to others, but here is an expert on the stand and he is giving his reasons why he used the overhead figures he did, and his methods, and it would seem to me, if he has prepared notes and has carefully tried to summarize what he is to say, like any other witness, he ought to be permitted to respond to the question by reading his notes. There is nothing wrong, he is reading his own notes.

The Master: I think I will let him read this. I do not think it will do any harm. It might if he were testifying to facts, but when he is testifying to matters of opinion, I think it is satisfactory.

A. (Continuing): —must be made in the light of circumstances in each case. If one machine merely replaces another for the performance of the same operation, very few elements of overhead would be likely to be changed.

Even if there is a difference of one or two or three machines for a relatively short time, most of the burden **(2496)** elements might be unaffected. However, if a change of any kind increases or decreases considerably the number of machines and the number of employees, and particularly if such a change is a permanent one, in that it lasts over a period of years, many more burden accounts are affected.

In the present instance, as far as the Model T production is concerned, we are considering the change from shapers to Melling lathes. The fact that the Melling lathes produced 50 per cent more shafts per hour than the shapers

meant that eight less lathes were required and four less operators on each shift. In the case of the Model A and tractor shafts, we are making a comparison over a period of years between Landis grinders and Melling lathes. Nearly three and a half times as many grinders as lathes would be required, and as one man is required for each grinder and one man operated two lathes, the grinding operation would require seven times as many men as the operation of the lathes. This means that 76 grinders would be required to do the work of 22 lathes and 76 operators on each shift would be required for the grinders as compared with 11 operators on each shift for the lathes. The operation performed appears to be a somewhat difficult one. Not only would such changes have a very considerable effect upon many of the elements of overhead within the department, but they would also materially modify the demands of the department upon non-productive departments such as general maintenance, tool rooms, and so forth.

The defendant has recently presented a current schedule of elements entering into its factory overhead, and while the **(2497)** elements may have been somewhat different during the period of infringement, it is worth while considering the present element, excluding, of course, social security taxes which were not in existence during the infringing period. In order to do so, it might be well to divide these elements into three groups,—first, those which would probably not be affected at all by changes in machines used upon the cam shafts; second, those elements which over a long period of time would be affected almost in direct proportion by the number of employees, and, third, those elements which would be affected in whole or in part by one or more of the following factors:

Number of machines.
Number of employees.
Cost of machines.
Space occupied.
Electric current used.

Generally speaking, these elements can be divided into the three groups, as follows:

In the first group:

Administrative salaries.
Depreciation of land improvements.

Depreciation of freight car equipment.
Depreciation of locomotive equipment.
Experimental engineering and designing.
Final inspection.
Repairs to land improvements.
Repairs to freight car equipment.
Repairs to locomotive equipment.

(2498) In the second group:

Factory supervision.
Miscellaneous manufacturing expense.
Expense tools.
Insurance—employees' liability and compensation.
Sweeping and cleaning.
Miscellaneous service for employees.
Timekeeping, payroll, and factory clerical salaries.
Power operation—heat, light and power (in part).

In the third group:

Depreciation of buildings.
Depreciation of machinery.
Depreciation of durable tools.
Depreciation of factory and miscellaneous equipment.
Depreciation of power equipment.
Insurance.
Moving, and re-arranging department.
Power operation—heat, light and power (in part).
Repairs to buildings.
Repairs to machinery.
Repairs to durable tools.
Repairs to factory and miscellaneous equipment.
Repairs to power equipment.
Taxes—state, city, county.

Numerically, the first group covers a considerable portion of the overhead elements, but they by no means represent a very important proportion of the total cost. Much has been said about administrative salaries not being affected, but the **(2499)** charge for such salaries is never, within my experience, anything but a negligible portion of the total factory overhead. If we assume that the expense so charged to the factory totaled one million dollars a year and that in the factory there were 50,000 productive

employees, the proportionate salary charge would amount to but $20 per employee per year or seven cents per employee per day,—but one per cent of productive labor and considerably less than one per cent of the total overhead.

The depreciation and repair items in the first group cannot possibly represent anything but a very small portion of the total overhead, and this same is probably true of experimental engineering and designing. Final inspection would probably be the largest single item and the only considerable one in the first group.

In the second group, factory supervision would probably be the largest item, and in a great many plants it is the largest of all overhead items. Because this item is so important its relation to number of employees should be considered. Over a period of years the factory supervision changes almost directly with the number of employees. As a matter of fact, the prime duty of foremen and general foremen is the supervision of employees and foremen for a given class of work can supervise efficiently just so many men. As the number of employees increases or decreases the foremen increase or decrease likewise. It is true that one man may be added without increasing the number of foremen, but at some point the addition of one man will call for another foreman, because the (2500) force under him is becoming unwieldy. It would not be fair to charge the entire foreman against this one man, although he was the immediate cause of the foreman's employment. The only fair method for distribution of supervision is on the basis of men employed, because that is the basic factor which governs the number of foremen and the amount paid them.

To illustrate this in the case of a change from Melling lathes to grinders:

If we assume one foreman for each ten employees, the addition of 65 employees per shift would add between six and seven foremen on each shift at a total cost of somewhere in the neighborhood of $4,000 per month, which would be a very considerable factor in departmental overhead.

Some of the other elements in the second group are of considerable magnitude in many plants and in total this group is very important. As an example, during that part of the infringing period in which A-6250 shafts were made, the tool costs for the grinders would probably have exceeded $60,000—I have made a calculation of my own of

that—while that for the Melling lathes would have been a little more than $4,000.

When the third group is considered, it is true that the elements therein are not affected primarily by the number of employees, although this has some bearing. The depreciation items are affected primarily by the number, cost and life of machines, space required, and by the power required to operate them. The cost of machines in the long run affects insurance, but this is a very small item. Generally speaking, the repair items are affected by the same factors that (2501) control the depreciation items. Taxes, in the long run, are controlled by the same factors as insurance. Power operation is affected by the power required to operate the machines although the elements of heat and light are controlled largely by space and number of employees. The moving and re-arranging of departments is generally affected by special conditions.

The most important element, in the third group, is the depreciation of machinery. When comparing the use of shapers and Melling lathes for the model T shaft, the evidence indicates that the depreciation charge for shapers would have totaled nearly $34,000 as against less than $17,000 for lathes. This shows a much greater proportionate increase in the depreciation of the shapers than the corresponding increase in productive labor.

In comparing grinding and turning with the Melling lathes, the increase in depreciation would not be as great proportionately as the increase in labor, but referring to the second group, the proportionate increase in tool cost would probably be more than twice as great as the proportionate increase in labor.

It seems clear that some of the elements not affected in proportion to labor would increase in greater proportion than labor and some less, but the changes which change labor costs likewise affect all of the elements in the third group, although not always in proportion.

If the defendant had presented a reasonable distribution and complete analysis of the elements of overhead in use during the infringing period, a fair analysis of the changes in (2502) the various items might reasonably have been made. I believe that the calculations I have made

showing widely varying figures from those presented by the defendant for a few segregated elements of overhead, indicates the futility of trying to pick out a few items where records are not complete and of basing the accounting thereon. In the absence of information which would permit of a definite and clear-cut analysis of each element of overhead, the only recourse is to use that method which will come closest to indicating the change in costs, and in the present instance, this is that of including factory overhead at the ratios to productive labor shown by the defendant.

The error in such a method would be very small either way, in my judgment.

Moreover, this is the method followed by the defendant in its accounting and in its determination of profits.

Reference is made to defendant's Statement of Account, Exhibit 11. In this exhibit a portion only of the operations required to produce a cam shaft are shown, but for each operation, burden has been added to the productive labor at the departmental ratio, and the note under the tabulation reads as follows:

> "The foregoing estimate is arrived at by taking the minute cost of the same operations on Model A cam shafts (see Exhibit 7), and by applying to such minute costs the average labor rate of $.80 per hour and a burden rate of 157 per cent, such burden rate being the burden applicable to the entire department in 1925. No record exists or **(2503)** were made to show actual costs of specific operations."

In Mr. Franklin's testimony regarding operation sheet, Exhibit 16, he shows clearly that the value of process inventory and therefore the company's profit, is based upon the application of both direct labor and departmental burden to each operation which had been performed upon the shafts at the time the inventories were taken, and this applies whether one, two or more operations had been performed.

That is a definite and recognized method of determining costs and profits, and, in my judgment, is the only one which could possibly be used in the present instance, and

give the truth in the case with the slightest possible amount of error.

Q. Now, Mr. Moise, referring to the Defendant's Exhibits C and C-1, in your opinion is the depreciation charged by the defendant to the Melling and the Ford cam shapers, correctly computed? A. No.

Q. Why not? A. Well, I explained that very carefully here, and I have got some figures here, so I would have to read this, Mr. Farley.

Mr. Farley: All right, I would like the record to show the witness is reading all of this from a prepared statement, that is all.

The Master: Very well.

A. I would like the record to show, then, that I have prepared this as a necessary part of my determination of what should be used in calculating this profit.

The defendants accept the machine hour production of T-410 shafts of 25 for the shapers and 35 for the Melling lathes, **(2504)** and yet in figuring depreciation assumes that 13 shapers could have done all the work performed by the 16 faster lathes, and that but 5 shapers should have been added to offset the six Melling machines in 1929.

The one reason given in justification is that a large production of T-410 shafts was accomplished in 1923 with only 13 shapers available.

Witness Aptekar, on pages 896-7, stated that in Model T days and at Highland Park, they did not have conveyor system so much as now and checkers used to carry stock from one machine to another to get out the production for each machine. When a shortage of machines for any particular operation exists and particularly when parts are moved by checkers between operations, it is very simple to run a deficient production machine an extra number of shifts or even to build up stock during the slower months of the year. With a complete conveyor system reduction in handling costs is obtained, but uniform operation of the various machines is required to a greater extent than when checkers are used. At the time the 16 Melling lathes were ordered and installed for model T production the following shapers were available, or would have been available had not the defendant changed to lathes:

On hand January 1, 1924	13
Built by defendant, completed and given brass tag numbers and apparently placed in operation early in 1924	4
Ordered outside and approximately 60 per cent completed, in fact completed to the point (2505) which calls for a $20,000 payment in cancellation of the order	5
Total, when the 16 lathes were received	22
This corresponds fairly well with the relative 25 and 35 production on the two types of machines. If the 25 and 37½ is the proper ratio, additional machines would have had to have been ordered, numbering	2
Total available or required for Model T production	24
Additions to correspond to the 6 Mellings purchased later and used in A-6250 production	9
Total probable shaper requirements for A-6250 shafts	33

Therefore, depreciation should have been figured on the basis of 24 to 33 (or at least 22 to 31 machines) instead of 13 to 18.

As the shapers become completely depreciated through the depreciation reserves actually used by the Ford Motor Company for income tax purposes, new ones should have supplanted them at the approximate current cost. This would have greatly changed the depreciation comparison.

With regard to the use of 13 machines, Wibel, on page 537, says that 5 shapers were ordered to take care of increased production and on page 539 stated "That would have been the only reason."

In order to make the production that required from 16 to 22 Mellings, the shapers running at approximately two-thirds the Mellings' speed would have had to number from 24 to 33 (2506) and as a matter of fact there were either finished or almost completed 22 shapers when the 16 Mellings were ordered. Exhibit O (Jackson shaper correspondence) indicates that defendant had been re-

questing early delivery of shapers ordered early in 1924, or to be delivered early in 1924, I do not recall which that was.

Now, that covers that depreciation feature, as I see it.

Q. Now, have you made a computation of the depreciation on the Mellings and the shapers which you, in your opinion, say the defendant should have used on defendant's theory that depreciation must be considered separately and not as an item of overhead, and also of course on the defendant's theory that the Ford cam shapers are a proper standard of comparison of the A and F shafts? A. I have made that for the purpose of comparison. I want to say that if I was accounting for profits in this manner I would use a greater number of shapers; I would use 24 in place of 22 to compare with the 16 Mellings. Here is my computation. They are photostated and there are four copies.

Mr. Spohn: Your Honor, do you think there will be any confusion in this record if I go on and number this computation Exhibit Z-4? I have our principal account in as Exhibit Z-3.

The Master: No, I do not think so.

(The computation referred to was marked Plaintiffs' Exhibit Z-4.)

Q. (By Mr. Spohn): Now, this computation which you have just handed me, and which has been marked for identification as Exhibit X-4, consists of three pages? **(2507)** A. The first page showing the estimated depreciation had model T type of shapers been used during the infringing period; the second sheet showing the estimated depreciation of Melling lathes upon same basis, and estimated for shapers, and the third being simply a work sheet which I believe need not have been brought along, showing how depreciation accumulates from year to year upon machines purchased at any given time.

Q. And, Mr. Moise, have you an extra copy of that? A. I think I have got a rough pencil copy here.

Q. If you have your rough pencil copy, can you use that? A. Yes, I think I can find that, it is in here somewhere. Yes, I have it.

Q. Will you explain that exhibit? A. Well, this is made up in the way that accountants customarily make up a depreciation statement when it is necessary to show each machine separately, that is the first sheet. It is necessary to show each of these separately, because many of them, at depreciation rates used by the Ford Motor Company, would have had to have been replaced during the infringing period, and that infringing period was a period, up to 1929, of constantly increasing costs.

About the fifth column there are some notes, A to L, and below they refer to machines, replacing those which became fully depreciated.

Now, in 1924 the shapers cost about $6,000, almost exactly, and I have used that same figure for simplicity.

In 1929 the Melling lathes purchased cost more than 140 per cent of those purchased in 1924, was it?

(2508) Q. When the first 16 were purchased? A. Yes. And, that is not at all out of line with what I recall of the increased costs of machinery during that period of expansion. Therefore, I have used the same ratio of increased cost for shapers that had to be purchased in 1924, over the $6,000, which was their approximate price in 1924, well, in the same proportion as the increased cost of the Mellings during the same period. During the interval I have gradually increased these prices. That means that the ratio of the cost of a Melling lathe and of a shaper remains practically the same.

Q. Now, in column 1 of sheets 1 and 2, you have the shaper costs per machine set down as you have estimated them? A. On sheet 1, that is the cost of shapers as far as they were actually purchased, the rest being stated as shown, replacement machines and others.

Q. And everything to the right of column 1 represents computation of depreciation, is that right? A. The next column there at cost, the next two columns, show the depreciation, approximate depreciation which should have already been charged to these particular machines. The customary method for purchasers has been used of using half a year's depreciation rate for the year in which purchased. That is generally done, instead of trying to figure out small fractions of years.

Q. Then the other half year you picked up as the year of disposal? A. Yes; in this case running ten and a

half years it worked out a **(2509)** little peculiarly, but the principle is there.

Q. And you used the same rate that the defendant used for income tax purposes? A. I used the same rate that the defendant used for income tax purposes.

Q. Now, have you any other sheet upon which you have re-capped the figures you have set forth in Exhibit Z-4? A. I have, two sheets, six copies of that.

Mr. Spohn: Exhibit Z-5.

(The document referred to was thereupon marked Exhibit Z-5.)

Q. (By Mr. Spohn): And these two recapitulation sheets, which you have just handed to me, and which I have had marked for identification as Plaintiffs' Exhibit Z-5— A. (Interposing): Well, they have the same figures on them, the same totals on them that Z-4 has, but they divide the depreciation arrived at between the A-6250 and the T-410 shafts in exactly the same manner and upon the same percentage bases as the defendant used in dividing the depreciation they determined upon these machines during the same period. In other words, you will note that the first three periods show 100 per cent of depreciation chargeable to the T-410 shafts, and then that goes to 82.79, on down to 1.66 to the T's, during the first half of January, 1929, and thereafter 100 per cent of it is charged to the A-6250 shafts. That is exactly the same in the computation for the Ford shapers and for the Melling cam lathes.

Q. Go ahead. A. Page 2 is a calculation of the depreciation had it been possible **(2510)** to use these shapers for the F-446 shafts, and it is not on the large sheet, it simply assumes that 1½ times as many shapers as Melling lathes would have been required, and so by the same method, using the same depreciation rates, works out the depreciation which on that basis would have been properly chargeable against the shapers and against the Melling cam lathes for the production of the F-446 shafts.

Q. Now turn to the first page of Exhibit Z-5 again. I understand your computation there, the depreciation on the shapers which you say should have been used by the defendant, totals $33,912.94? A. That is the part chargeable to T-410. The total was $96,000; if you run to March

15, 1931, it should have been $96,875.98, of which $33,912.94 was chargeable to the T-410 shaft and $62,963.04 chargeable to the A-6250 shafts.

Q. Upon the Melling cam lathes? A. Upon the Melling cam lathes. The total depreciation was $43,746.76, of which $16,925.41 was chargeable to the T-410 shafts, and $26,821.35 was chargeable to the A-6250 shafts. This method of figuring depreciation is a recognized and accepted one by accountants and is, I believe, subject to the fact that I do not consider enough cam shapers have been used in the computation, correct in this case.

Q. All on the theory of defendant's accounting in this matter? A. Assuming, of course, that the Model T type of shapers could have been used to produce all shafts, which I do not recognize, and it is not up to me to determine.

Q. Now, how about your account, how did you compute depreciation? I say, in your account, Exhibit Z-3, how did you compute **(2511)** depreciation? A. The depreciation is included in the total overhead, because I included all elements of overhead, and depreciation is one of the elements of that overhead.

Q. In your judgment, does the inclusion of depreciation as an element of overhead in your account conform to the proper accounting practices? A. In this case it is the only one, and it is good in generally recognized accounting practices.

Q. Now, with respect to the defendant's accounts, Exhibits Z and Z-1, you will notice that there are included in those accounts certain charges for cost of items of maintenance and repair and overhead, overhaul separately set forth? A. Yes, they are; I have noticed that.

Q. Are those items correctly reflected and included in the defendant's account, according to your opinion? A. No, sir.

Q. Why not? A. The defendant's accounts ignore three shaper overhauls, although stating that they had been made, simply because the amounts were not available, while fourteen overhauls of the other machine were used because the cost was available; and in the final accounting, it does not seem right to have ignored the definite testimony of Mr. Schmidt, the foreman in charge of maintenance in Department 410, to the effect that each shaper was taken bodily out of the department once a year, moved

to the main tool room and completely overhauled. Such an expense would not be directly charged against Department **(2512)** 410, but would, nevertheless, be an expense applicable to the shapers, whereas all of the Melling overhauling was, upon the basis of the testimony of Mr. Schmidt and his assistant, performed by the maintenance crew in Department 410 and some men in the apparently adjoining foundry tool room. Therefore, the maintenance men would perform this overhauling service for the Mellings within the department. It would not be a net additional charge against the cost of the use of the Melling machines, but would offset or partially offset, the corresponding work in the main tool room upon the shapers.

The defendant's accounting for maintenance also accepted the fact that a total of five men were needed throughout the three shifts to care for the maintenance of the shapers when 13 shapers were used, but failed to estimate any additional number of men needed for the increased number of shapers required, or had the shapers been suitable for use upon the Model A shaft—for additional shapers required when, as presumed by defendant, the shapers would have been used for the Model A shafts, nor did it recognize the necessity for more men when more shapers were ordered for the T production. In other words, if 13 shapers required this number of men, an increase anywhere up to 33 would probably have required a correspondingly increased number of maintenance men.

There is in my judgment no reasonable evidence to the effect that Melling overhauls were in any way due to the character of the machines or that the lathes had been worn out by the production of T-410 shafts.

Nearly all of the overhauling orders specified that the machines were to be prepared for turning the cams upon the **(2513)** new A-6250 shafts. This preparation required considerable alteration in the overhead portion of the lathe, including installation of new masters for tool guidance.

It was only reasonable, at a time when a new product was to be placed in production (a product calling for much closer tolerances and better workmanship than its predecessor) and when the machines had to be partially torn down for these necessary changes, to go over them thoroughly, replacing bushings and other parts, even if but slightly worn. It would have been very strange if such a

procedure had not been followed, since new overhead cams had to be inserted anyway, for A-6250 production.

The replacement parts actually called for by the work orders were not all extensive. It seems extremely unreasonable to jump to the conclusions reflected in defendant's statement of account. Moreover, when assuming that the re-building was a proper charge against operation of the Melling lathes, it seems hardly fair to exclude the re-building costs of the cam shapers.

Mr. Farley: I would just like to call your attention at this point, if your Honor please, as to how highly argumentative this so-called testimony is.

Mr. Spohn: The witness is giving the reason here as an expert with respect to this accounting matter. As your Honor pointed out once before, an expert witness sometimes has a color of argument, but that does not destroy the effectiveness of his testimony.

The Master: I think the testimony is perfectly **(2514)** competent.

A. It is true, at the time the defendant's account was made, only three of the inventory cards bore a re-building notation, but at least a reasonable estimate of the cost of these three re-buildings should have been used as a partial offset to the overhauling of the Mellings.

Moreover, definite evidence given since the preparation of defendant's further statement of account, made clear that each shaper was rebuilt approximately once a year. This evidence, however, was entirely ignored by defendant when presenting their latest accounting, Exhibit 301.

Now, I have about twenty notes or so on maintenance. All I could find. I have considered them all fully in arriving at the conclusions I have.

Q. Now, have you made any computation yourself of the maintenance and overhaul charge on the shapers and the Melling machines which, in your opinion, should have been used by the defendant in its accounting, on its theory of the Ford cam shapers as a standard of comparison for the A and the F shafts? A. I have, and I want to say that I consider it understates the expense of the shapers, because I think that an investigation will prove they were considerably more. However, it just merely illustrates the

difference between using, as I see it, all the evidence and only part of it in preparing an account.

(A document was thereupon marked Plaintiffs' Exhibit No. Z-6.)

Q. This report which you have just handed to me, and which I have marked for identification as Plaintiffs' Exhibit Z-6, consists of four pages? **(2515)** A. Yes.

Q. Now will you explain that report, Exhibit Z-6? A. The first page has to do with the T-410 shafts. The second page with A-6250 shafts; the third page with F-446 shafts, and the fourth page is an analysis of overhaul expense which applies to all three of the shafts.

Q. What is your page 1, what did you set forth on that? A. On page 1 I have used exactly the same figures as used by defendants in their final accounting for the maintenance of 13 shapers, and also for the maintenance of the Melling cam lathes. The total of the maintenance for 13 shapers was $8,252.10, as shown by defendant, of the Melling cam lathes $14,853.80, as shown by the defendant. However, in the next to the last column I have added a proportional increase for 9 additional shapers to bring the 13 up to 22. That adds to the shapers $5,713, making a total amount of maintenance for the 22 shapers, $13,965.09.

I have also added something to the Melling cost, although there is no evidence that all of it should be added. If you will refer to note "A," which explains the figures in the second column of the Melling cam lathe portion under "foundry tool room," there were two men in foundry tool room on each of two shifts who repaired slides. The proportion of their time so occupied was not stated, nevertheless I have above included all their time, and for that reason I have added $6,601.68, which assumes, although not definitely stated, all of the expense of two men in the foundry tool room, was chargeable to these slides; that makes a total of $21,455.48, as **(2516)** maintenance costs for the Melling cam lathes for the T-410 shafts.

Now, if you will look at the notes below, all overhauling of Melling cam lathes was performed in production department and by the above maintenance crew. Therefore, overhaul expenses included in above total for Melling lathes. Each shaper was removed from the production department once a year, taken to the main tool room and com-

pletely overhauled by an entirely different set of men. The proportion of this total overhaul chargeable to T-410, is $29,000.

Now you go to page 4. Overhaul expense. Overhauling of Melling cam lathes was done by maintenance crews in Department 410. Therefore, cost of overhauling is included in maintenance cost. In the case of Ford shapers, however, each machine was removed bodily from Department 410 once each year, taken to the main tool room and completely overhauled by men not connected with Department 410. No cost of these overhauls has been supplied, but a complete overhaul of expensive machines such as the cam shapers may well have averaged $1,000. It would hardly be less than $500. If in the absence of information the average overhaul cost is estimated at $500, the following additional cost would be chargeable to the shapers, and there that calculation below shows the overhauls at the rate of one per year per machine, that would have been required for each of the three types of shafts, and the total for the 410 is $29,000. For A-6250 it is $40,000. For F-446 it is $4,250, and for all of them $73,250.

(2517) Now, the first page in recapitulation shows the shapers maintenance as above on the same page, $13,965.09, overhaul $29,000, total $42,965.09. For the Melling lathes maintenance $21,455.48, as shown earlier in the same sheet, overhaul included in maintenance, so that the total chargeable against the Mellings used for the T-410 shafts was $21,455.48.

Now, page 2 is an exactly similar thing, calculation or tabulation for the A-6250 shaft. I do not know whether it is necessary to go through with it or not.

Q. There is a recapitulation on the bottom of it? A. The figures are determined in exactly the same way as the figures for T-410. The recapitulation shows shapers maintenance, $52,410.44, taken from the corresponding figures at the top of the same sheet, overhaul $40,000, which comes from page 4, total maintenance and overhaul charged against shapers $92,410.44. For the Melling lathes maintenance $66,423.58, taken from the corresponding figure higher on the same sheet, overhaul included in maintenance, so that the total charge for maintenance of Melling lathes on A-6250 shafts is $66,423.58.

I would call attention to the note on this sheet which refers only to the A-6250 shafts, the hours worked appear excessive on this sheet. This is because a full maintenance crew is assumed out every shift. If production per shift was 2913 in April, 1930, which it was, and only 1541 per shift in September, 1928, a considerably smaller number of machines would have been required during the latter month and the whole maintenance crew would not have been required.

Q. Page 3. **(2518)** A. Page 3 has to do with the F-446 shafts.

Q. And is it computed on the same basis? A. And it is computed on the same general basis. It is a little different in there because there are no data directly for the F-446 shafts in this respect, so that it simply states if 22 shapers would have been required for T-410 shafts, and 3 for the F-446 shafts, during the same period of time, the maintenance can be estimated for F-446 as 3/22nds of that for the T shafts, or 13.64 per cent. As the production period for T shafts selected for maintenance calculations was from June 16, 1925, to May 31, 1927, 23½ months, and the production period for F-446 shafts was from June 16, 1925, to March 31, 1928, a period of 33½ months, the time for the F-446 should be increased proportionately, or by 43.55 per cent. Now, a multiplication of these two factors shows that the maintenance of the shapers for the F-446 shafts should have been .1958 times that for the T shafts, or $2,734.36, and for the Melling lathes, the same percentage of $21,455.48, or $4,200. In the recapitulation the shaper maintenance is as shown earlier, $2,734.36, with the overhaul from page 4, $4,250, a total charge for maintenance and overhaul of shapers, which theoretically are assumed to have been used on the F-446 shafts, of $6,984.36.

For the Melling lathes, maintenance, $4,200.98, that including the overhaul.

Q. Now, your report in Exhibit Z-3, how did you make allowance, if any, for overhaul and maintenance? A. Through the inclusion of maintenance as an element of the **(2518½)** overhead.

Q. Well, in your opinion does your method of treating maintenance and overhaul conform to the best accounting practice? A. I think so.

(2519) Q. Now, referring again to the defendant's accounts, Exhibit C and Exhibit C-1, do those accounts take into consideration the amount of tool cost on the shapers and the Melling machines? A. They do not. I think that is another thing which seems to me incorrect in the defendant's accounts, the bringing in of the apparently—

Mr. Farley (Interposing): You are still reading from your prepared statement?

A. This is just a note here, yes, although I could say this without it. (Continuing): —the bringing in of the apparently heavier grinding cost for tools used upon the Melling lathes and so stating that apparently these tools cost more, while ignoring the fairly definite record in the original statement of accounting regarding the much heavier original cost of shaper tools as compared with the Melling lathes, can hardly present a fair comparison—or, the Melling lathe tool, can hardly present a fair comparison in this case.

Q. Have you made a computation of tool cost, assuming that it should be considered separately as an item, and not as a part of overhead? A. Yes. Here are six copies.

Mr. Spohn: Will you mark that, please?

(The document above-referred to was thereupon marked Plaintiff's Exhibit Z-7 by the reporter.)

Q. This report you just handed to me, and which I have marked for identification as Exhibit Z-7 has two pages to it? A. Yes.

Q. Now, will you explain that computation? (2520) A. I think it would be well to go to the second page first, because the first page is a calculation from it. The Ford cam shapers, Exhibit 9(g), of defendant's statement of account, gives tool cost per T-410 cam shaft, based on a record for '22 and '23 as .00270.

As to grinding cost, page 1765 of typewritten record of hearing, beginning January 16, 1939, states that grinding 12 tools requires 15 man minutes.

I might say—it is not on this statement—that there was a little variation on that, but that was the average; the figures I have used as of the time required. 15 minutes at 90 cents per hour comes to 22½ cents.

The cost of grinding eight tools would be ⅔ of that, or 15 cents.

Now, assuming 500 shafts per set of eight tools, the grinding cost of tools per each T-410 shaft would be 15 cents divided by 500, or .00030. That gives a total cost for tool purchase, replacement and grinding, of .00300; tool cost per T-410 shaft—that is, the total tool cost.

Had it been possible to use the T-410 shaper for the large bearing shafts, the cost would probably have been proportionate to area of cams, and that produces for A-6250 a tool cost per shaft of .00344, and for F-446, .00556.

For the Melling lathes; the cost of eight tools, per Exhibit 8(h) of defendant's statement of account was $2.00. The hours of life per the same exhibit, 200. Production per machine hour on the T-410 shaft, 37½.

T-410 cam shafts per tool life, 37½ times 200, or 7500. Cost per T-410 cam shaft, $2, divided by 7500, or .00027.

(2521) Grinding cost, page 1765 of typewritten record of hearing beginning January 16, 1939, states grinding 12 tools requires 30 man minutes. 30 minutes at 90 cents per hour, 45 cents. Grinding cost of 8 tools, two-thirds of 45 or 30 cents. Assuming 500 shafts per set of 8 tools, grinding cost of tool for each T-410 shaft, 30 divided by 500, or .00060. Total cost per T-410 shaft, .00087.

The same method of calculation as used above gives a cost for the A-6250 shaft of .00100, and for the F-446 shaft, .00161.

Now, the first sheet simply takes a production as used in this report, this Exhibit Z-3, of each of the types of shafts, and multiplies it by the respective total tool cost per shaft, bringing a charge for the Ford shapers, a tool charge for the Ford shapers, for all types, of $26,320.31; for the Melling cam lathe, of $7,642.36.

Q. Now, in your account, Exhibit Z-3, did you make any allowance for tool maintenance and cost? A. I did, by inclusion in the total.

Q. Total what? A. The total overhead. Inclusion of the total overhead because tool cost is an element of overhead.

Q. Now, in your opinion, does your method of handling tool cost and maintenance by inclusion in overhead compare to the best accounting practice? A. It does.

Mr. Spohn: Now, if your Honor please, I would like to offer in evidence Exhibits Z-4, Z-5, Z-6 and Z-7, as illustrative of the accounting for depreciation, overhaul and **(2522)** expense, and tool cost on defendant's theory of accounting; that is, on their own theory that those should have been the costs that they should have used. Of course, as we point out in our accounting, we have used general overhead to cover those particular elements.

The Master: I will admit these exhibits.

Mr. Farley: Of course, I want to make the objection, that subject to further facts that I will bring out on cross examination as to the accuracy of them.

Mr. Spohn: And, if your Honor please, I offered Exhibit Z-3 this morning. I understand your ruling was you allowed it.

The Master: Yes.

Mr. Spohn: Yes. May we have five minutes?

The Master: Are you through with your examination?

* * * * *

RE-CROSS EXAMINATION by Mr. Farley.

* * * * *

(2524) Q. Now, referring to page 4 of your account, Exhibit Z-3—first, referring to page 3, you get a total savings on productive labor, you get a figure of $387,305.84, is that right? A. That is correct.

Q. Whereas, on page 4, you get a total of $508,488.11 as a burden savings, do you not? A. That is true.

Q. And, that five hundred thousand dollars, as compared with the three hundred and eighty-seven thousand amounts to an increase of approximately 130 per cent, isn't that about right? Mr. Woehrle just figured it out. A. Approximately that.

Q. Now, your testimony was that the inclusion of the full burden rate to establish savings was in accordance with the best accounting practice. If you were put on a job as an accountant for the purpose of determining profits made by the sale by the Ford Motor Company of any particular part, then you would take the actual cost of the part as shown by productive labor, and you would add to it, of

course, the percentage burden to get the cost of that part to the producer, and anything over and above that which they would realize as the sale, of course, would give you profits? A. Pardon me, I did not say that necessarily that method was the **(2525)** best of all accounting practices. I said it was a generally recognized and accepted accounting practice, and that in the absence of a complete breakdown of all elements of overhead which could reasonably be divided and shown against one kind of operation or another, it was the best possible and most accurate method that could be used.

Q. Well, now, when you say that is accepted accounting practice, of course, it would be accepted accounting practice for a situation such as I outlined where you were going to get the cost and the profits that might be made by sales. It would be accepted accounting practice for that sort of situation. I didn't make any particular note, but I am just wondering if you would be good enough to give me—as I recall it you separated the items of burden into three particular groups. I wonder if you would read those off again. A. I would be very glad to. The first group, "Administrative Salaries." I think you have a list of those. You can check those first, second and third, if you want.

Q. Yes? A. Mark the "Administrative Salaries" in the first group. That is one. Then, depreciation of land improvements; depreciation of freight car equipment.

Q. They are all in one? A. All in one, yes; all of these I am reading can be marked one.

The Master: Do you have some particular heading for that group?

A. That is the group which would not be affected, probably, by these machines, the group one. Have you that freight car equipment?

(2526) Mr. Farley: Yes. Locomotive equipment.

A. (Continuing): Experimental engineering and designing; final inspection; repairs to land improvements; repairs to freight car equipment; repairs to locomotive equipment.

That is the group which probably would not be affected by this fact—at least, not affected by the amount of labor.

Q. (By Mr. Farley, continuing): How about repairs to power equipment? Which group do you put that in? A. Pardon me?

Q. Go ahead. A. The second group: Factory supervision; miscellaneous manufacturing expense; expense tools; insurance—employees liability and compensation; sweeping and cleaning; miscellaneous service for employees; timekeeping, payroll and factory clerical salaries; power operation—heat, light and power (in part).

I might say heat and light largely.

Q. Only part of that power operation? A. Well, that covers heat, light and power. Heat and light would be largely controlled by the number of people; at least, it would be a large element.

The third group: Depreciation of buildings; depreciation of machinery; depreciation of durable tools; depreciation of factory and miscellaneous equipment; depreciation of power equipment; insurance—that, of course, being property insurance.

Moving and rearranging department; power operation —heat, light and power.

Q. I see. A. That is in part, again. That goes part in one, and part in the **(2527)** other class.

Repairs to buildings; repairs to machinery; repairs to durable tools; repairs to factory and miscellaneous equipment; repairs to power equipment; taxes—State, City, County.

I believe that will cover all of those except the Social Security Taxes, which naturally is not pertinent to the period of infringement.

Q. Now, as I understood your testimony it is that the items of burden under one are not properly allocated to any change in the machinery; is that the idea? A. Not to any considerable extent; no.

Q. And, what was your testimony about the ones you put in the second group? A. The second group will, over a long period of time, change almost in proportion, almost directly in proportion to the number of employees.

Q. I see. How about the third group? A. The third group is affected by several elements; one of them being number of machines; another being number of employees, another being cost of machinery, space occupied, electric current used, and maybe a few more elements might affect them slightly.

Q. Now, I understand your testimony was that you didn't have any break-down of these particular items. You took the entire burden and just added it entirely to your so-called savings? A. I did, stating that some of the elements which would not change directly would change more rapidly and some less rapidly.

(2528) Q. Now, if the break-down were furnished to you of these items, and how they were ascribed to the departmental overhead, would you then not say that your total overhead, as you have figured it out, should be modified accordingly?

Mr. Spohn: Just a minute, do I understand that is available?

Mr. Farley: Yes.

Mr. Spohn: It has been requested heretofore, hasn't it?

Mr. Farley: I don't know that it has; I don't think it has.

Mr. Spohn: Sure it has.

The Witness: It was definitely stated by Mr. Hovis it was not available.

Mr. Spohn: Why, yes, time after time that has been requested.

Mr. Farley: I don't know. I don't recall that it has.

Mr. Woehrle: We have present-day records.

Mr. Spohn: I know you have present-day records, but the data we required was covering the infringing period, the break-down. Do we have that notice to produce? I understood Mr. Hovis stated a break-down was not available for any of those years.

The Master: Do you understand you have present day break-downs?

Mr. Woehrle: Oh, yes, of course. I don't know how far back it goes.

Mr. Spohn: The fact is, Mr. Woehrle, there is no break-down for any of the years covered by this accounting period.

(2529) Mr. Woehrle: That is right.

The Witness: There is another element covered in that overhead.

The Master: Just a moment.

Mr. Farley: Just a moment. I just glanced over the notice to produce that you referred to, Mr. Spohn, and I don't find any notice going to that proposition of break-down of overhead cost.

Mr. Spohn: I understand not, because Mr. Hovis' testimony was, on cross examination, that the details were not available on the break-down; definitely so.

Mr. Farley: Well, in any event I think I am entitled to an answer to that question, if your Honor please.

Mr. Spohn: I have no doubt counsel is entitled to the answer, but if the data isn't available, I don't see what good the answer does.

The Master: Well, I will hear the answer and question, anyway.

(Question read by the reporter.)

A. If it will be modified, decreased, I don't know. It might modify it somewhat, which way I have no means of knowing; but, it would modify it, in my judgment, very slightly.

Q. Well, certainly, if by your own testimony all of the items included in your group 1 are not properly ascribed to any change in an operation forming a part of the department, the addition of those items of burden tend to increase the figures rather than decrease, wouldn't they? A. In the first place, that is true to this extent, that they would not change in proportion to labor. They would change very little, probably, but they are, generally speaking, completely **(2530)** within my experience a very small proportional part of total factory overhead; and, moreover, the overhead rates which we have used almost certainly, in my judgment, are less than the total overhead for the Ford Motor Company, because in most years the smaller months which always increase an annual overhead are omitted from the cost summary cards, and, therefore, our rates are lower, in all probability, than the total cost of producing these shafts by the Ford Motor Company over the entire period.

Q. Now, what has been your experience with respect to this matter of overhead in large plants such as the Ford Motor Company? Wouldn't you say that those figures would run substantially the same from one year to an-

other, or would they vary very much, or do you know anything about that? A. I know of no company which carries its overhead very closely to the same manner that they did as long ago as that. There would have been very material changes in practically every company that I have had the experience with; partially due to the tax laws, necessity for more accurate accounting, and partially due to education in the value of costs.

Q. Of course, the ones you group under Group 2, as I understood your testimony, those would vary or might vary in accordance with the number of employees on any particular operation? A. They would vary over a long period of time almost in direct proportion, in my experience.

Q. And, with respect to your grouping of 3, any variation there would depend upon the fact that—largely upon the fact that the number of machines used for the standard of comparison would require a great deal more space than, let us say, the Landis **(2531)** grinders as compared with the Melling machines? A. Yes. They would require a great deal more space than the Melling machines. But, space is not the only factor, of course. It is only one of a number. It isn't even the principal factor.

Q. Now, you have taken your Group 2 which would, as I understand your testimony, in your opinion, depend upon the larger number of employees. Assuming there were a very much larger number of employees, the overhead items in Group 2 would probably be increased. That is, the burden would increase if, as you stated, there would be three or four times as many employees for the use of Landis grinders? A. That is true, because generally those over a period follow almost in proportion to direct labor.

Q. In checking against this list I find that there are eight of those items of overhead which you would say would probably have to be—result in an increase in the burden if some 70 additional employees might have been used on the production of model A shafts; that is, if the Ford Motor Company had used Landis grinders for the production of A shafts, some of the eight items of the entire list of items which go to make up the overhead might have been increased in so far as the burden figures are concerned? A. That is something like 200 employees; approximately 70 on a shift. And, these are eight items

which I picked out that would generally be increased in proportion. But, the number of overhead items means very little. The amount that they represent, the dollars they represent, is the important factor. You frequently find two or three items of overhead **(2532)** include more than 50 per cent of the total overhead in the factory. The ones in the first group, with possibly one exception, would be in my experience quite small.

Q. Which of the ones would you pick out as the ones of two or three items which would be the larger ones? A. In the second group, generally speaking, the factory supervision is the largest single element of overhead in most plants.

Q. And, I think the list here as given by Mr. Woehrle of the items which go to make up burden include some thirty-one items? A. Of which thirty might be applicable, because one is Social Security taxes.

Q. But, in your burden figure of $508,488.11, as contained on page 4 of your report, all of those are included in that burden. That is so, isn't it? A. They are. We have presented some figures showing how some of the others would increase that are not in direct proportion, and some of those are much greater than the proportional increase in labor. For example, in that second group—

Mr. Spohn (Interposing): Just a moment.

The Master: Wait a minute.

Mr. Spohn: Mr. Moise, just a moment, counsel is talking.

The Witness: I beg your pardon.

Mr. Farley: I am sorry. You may continue now, Mr. Moise.

The Master: Now, you can state the example.

A. For instance, in this second group which, I said, generally speaking, pretty well follow the amount of labor, probably the grinding tools would be included in expense tools, the grinding **(2533)** and the other. From evidence given I have calculated that for the A-6250 shaft, tools and grinders, grinding wheels, it cost something like 15 times as much as for the Melling lathes including the grinding upon the latter, which is well over twice the increase in labor. There is an element which increases more than twice as fast as labor, according to my calculation.

Q. That is based on the assumption, of course, that the Ford Company, when they started model A production, that the only other recourse they would have had would be to go to Landis grinders? A. This is all based upon the standards of comparison, which I have stated were the Landis grinders.

Q. Of course, if the standard of comparison is that of a machine or machines which we will assume would involve no substantial increase in the space occupied by the machine, then none of the No. 2 items would apply, isn't that true? A. Oh, yes.

Q. Or, No. 3 items, I mean? A. Oh, yes, they would. For instance, depreciation would be more, and more expensive machines, much more. We have shown that.

Q. Of course, machinery depreciation? A. That is probably the biggest item in that third group.

Q. Yes. And, in so far as the comparison which confronts the Court here is concerned, if the items of depreciation of machinery and expense of tools, tool expense, and maintenance cost are established, they are the most important contributing factors in so far as the average of burden is concerned, isn't that true? **(2534)** A. No, I wouldn't say so. Of all the elements of burden?

The Master: Are you speaking of all the elements or restricting yourself to the third group?

Mr. Farley: I am speaking of the third group, yes; I am speaking of the third group.

The Witness: I do not know what are meant by durable tools, and expense tools. They might be mixed up. The charge for tools is widely variant in different factories, but probably the machinery item would be the biggest single item in that group.

Q. Repair of machinery and depreciation of machinery? A. Yes. Yes, that would be true.

Q. I think, if my memory serves me right, Mr. Hovis testified durable tools were such things as presses, and things of that kind, which last almost indefinitely? A. Yes.

Q. And, of course, any repair to those tools naturally wouldn't have anything to do with the repairs to the type of machines that are used for this cam shaft operation? A. If those things are excusable items which have noth-

ing to do with these machines, but I don't know. Probably then the tools of this might be charged to the expense tools on the second group.

Q. And, it wouldn't be your considered opinion, would it, that there would be any difference in the cost of locomotive and freight car equipment, and locomotive and freight car repairs, because of a change of an operation from one machine to another in the plant? A. Oh, no. I can't see where there would be any change in the **(2535)** depreciation of freight car equipment or locomotive equipment.

Q. Nevertheless, those figures are included in your figure of $500,000, are they not? A. Yes, but they are insignificant, in my experience.

Q. And, the same thing would be true, would it not, with respect to the administrative salaries? A. Yes, which could not, probably, amount to 1 percent of the total.

Q. That fact is true with all your items of group 1? A. Yes. They are segregated for that purpose, because they would not be materially affected, in my judgment.

Q. It is quite clear from your statement of account there has been no attempt made for any segregation of those items? A. It hasn't been possible.

* * * * *

(2544) Q. And, if the straightening operation is included as an element of cost on the Melling machines, referring to your Table 3—on page 3, rather, and the first table there, of course, it would convert those figures of savings into a loss? A. I believe it would.

Q. As we testified before with respect to Exhibits Z-1 and Z-2? A. Yes. Those are not materially changed.

Mr. Spohn: Mr. Farley, may I have a question of Mr. Woehrle right now along this line?

Mr. Woehrle, were the production figures of June, 1925, pro rated?

Mr. Woehrle: Yes.

Mr. Spohn: They were pro rated June 15 to the half of the month total, isn't that right?

Mr. Woehrle: That is right.

Mr. Farley: That was because of the fact you didn't have a Form 2202-B available at that time?

Mr. Woehrle: Yes.

Q. (By Mr. Farley, continuing): And, of course, the modification of those figures would also modify the—of course, it is quite obviously true that if the productive labor figures show a loss rather than a profit, the taking of the full burden rate would very materially increase that loss rather than decrease it? A. Oh, yes. It increases the loss, or increases the profit.

Q. Well, now, referring to Exhibit Z-4, Mr. Moise, in the third column—do you have a copy of that, your Honor?

The Master: Yes.

(2545) Mr. Spohn: It is the long one, your Honor.

The Master: Yes.

Q. (By Mr. Farley): Referring to the third vertical column under the heading "Depreciation to 6/15/25." A. Yes.

Q. (Continuing): —"Per cent," I would like to ask there, Mr. Moise, what annual figure of depreciation did you use to get these figures of 94.72, 85.10, 75.60, and so forth? A. If you will refer to the footnote on the bottom of this exhibit, it reads: "In order to determine when shapers would have become fully depreciated and presumably replaced at current costs, it is assumed that they had been depreciated at 9½ per cent, and therefore had an effective life of about 10½ years."

That, Mr. Woehrle testified for several years back of this—I don't recall just how far—they had used this 9½ per cent rate. I think it was back—well, I can't recall. I think from 1920. That is just memory.

Q. I see. You are taking the same figures used by Mr. Woehrle in computing depreciation during the years of the accounting period? A. For each individual machine I have used the same rates he had.

Q. If the rate in the years prior to 1920 had been 12½ percent rather than 9½ percent, the depreciation as figured by you during these years up to 1924 should be modified accordingly, should they not? A. Slightly modified. I think 'way back before the Tax Examiners changed their depreciation rate, I think Mr. Hovis said that they used 12½, but Mr. Woehrle stated, I believe, (2546) during the greater part of the life of these shapers, at least, that they had used the 9½ rate, which is about 10½ years, and Mr. Woehrle stated that he had, I believe he stated, in fig-

uring his depreciation, he had given these shapers a life of 10½ years in his accounting procedure. This is an effort to follow as closely as possible the method used by defendant modifying, of course, by the number of machines and the cost of later machines.

Q. Now, as I understand your depreciation figures, you have added some 9 machines, 9 shapers, to the 13; isn't that correct? A. I have added 9 shapers at the time they bought 6 Mellings, on the basis of about 50 percent more production on the Melling than on the other, so that if it required 6, you would have added 9—to replace 9 shapers instead of 6 Mellings.

Q. I don't know whether I understand your figures or not, Mr. Moise. You have recapitulated, as I understand it, your depreciation cost on your Exhibit Z-5? A. Yes, sir, and split it between the T-410 shaft and the A-6250 shaft in the same percentages that Mr. Woehrle used in putting the depreciation for those periods. I just used his without checking them. I think he based them on the number of shafts of different kinds produced within a year, and I used exactly his percentages without checking them.

Q. Now, do I understand that on your depreciation cost on cam shaft shapers you used a total of 21 shapers on this first column of— A. (Interrupting): You will find at the bottom of the column on **(2547)** this each one shows the number used each year; 22 in the last half of 1925; 22 in 1927; 22 in 1928; 31 and 30 in 1929, because in the course of 1929 one of these machines was sold and, therefore, I took out a shaper. 30 in 1930, and 30 in 1931. I have recognized the sale of a Melling machine, and deducted a cam shaft machine. I couldn't deduct two.

Mr. Spohn: Or 1½.

A. I could have deducted 1½.

Q. (By Mr. Farley, continuing): Did you take into consideration the fact that in the years 1923 and 1924, which years were practically 2 million production years of the Ford Motor Company, 1923 I recall was just under 2 million, and 1924 just over, or vice versa.

Mr. Spohn: Vice versa.

A. I think you will find 1923 is nearer the 2 million. 1922 is not so high.

Q. 1923 and 1924 I am speaking of. 1923 was just over 2 million, and 1922 was just under 2 million. Did you take into consideration that during all of that period of time 13 shapers turned out the entire output? A. During 1924?

Q. 1923 and 1924. A. When were these shapers purchased?

Mr. Spohn: Mellings?

Q. (By Mr. Farley, continuing): Let us eliminate the year 1924. Let us say, did you take into consideration, then, the fact in the year 1923 the 13 shapers available turned out the entire production on model T shafts of over 2 million? **(2548)** A. I did. You will notice it was back in 1923 Mr. Weibel made this schedule for ordering, made this first schedule for release to Melling machines; that Exhibit we were talking about—I forget the number, but, about the middle of 1923; and, that gave the relative speeds of the two.

Q. But, by that time the bulk of the shapers, or several of the shapers—at least 4 or 5 of them—had been fully depreciated, had they not? A. No. None of them except —not one of them had been fully depreciated at that time, not until the latter part of 1925, the first one, I believe the latter part. 7089, the first one, had been scrapped before that, in 1921; and, the next one was not fully depreciated until the close of 1925 or early in 1926; the next three a year later, and the next six, I think, a year later, and so on. The dates are given on there. If you will notice on the 4th column of my report, I say: "Year fully depreciated close of."

Q. Yes, I see that. A. And, if lower rates were used, then they would have had still longer to run.

Q. You said if lower rates were used. As a matter of fact, higher rates were used in those years, were they not? A. No; 12½ years.

Q. 12½ percent? A. What life did they use?

Q. Eight years prior; 12½ percent. A. That is right. The department cut them down. You will note, however, all these machines were operating in 1924 when they bought the Mellings; according to Mr. Smith up to the close **(2549)** of 1924, and maybe early in 1925.

Q. Now, referring to your Exhibit Z-6. A. Which one is that? Mine are not numbered.

Mr. Spohn: Maintenance.

The Witness: Maintenance; O.K.

Q. (By Mr. Farley, continuing): Now, as I understand your calculation of maintenance, you state in your second note on page 1 of that, "All overhauling of Melling cam lathes was performed in production department and by the above maintenance crew. Therefore, overhaul expense is included in above total for Melling lathes."

Mr. Woehrle included in his cost of maintenance a number of extraordinary repairs that were shown by various work sheets. You understood that? A. Yes, I understood that.

Q. And, did you take into account a set of work sheets that we turned over to you, or, rather, turned over to the plaintiffs, and some of which were introduced in evidence as P-1 to P-14? The first one of them, P-1, is an order to move Melling cam lathe, and it gives the brass tag number, from K-7 building to B-58 foundry. Doesn't that indicate clearly that that repair work was done at some other place rather than by the same maintenance crew, as in the department?

Mr. Spohn: If you know.

A. I think Mr. Schmidt stated he had two men in the foundry tool room that worked on these slides. That was not the main tool room. Where the foundry tool room is, or the foundry, I do not know. I have allowed two full men, although I do not know whether they worked on that all the time in the foundry **(2550)** tool room. It was a very large charge during this period.

Q. You haven't consulted those work orders— A. (Interrupting): I have seen them.

Q. (Continuing): To see the type of work that was done, have you? A. Some of them I have been over.

Q. Well, referring to the orders under P-1, they state, the first one, make 1 cast-iron casting as per sample; and, the next one, make 8 bronze split bushings as per sketch; next one, make 4 bronze bushings as per sketch; next one, furnish 2 castings as per above number; next is make 7 bronze bushings as per sketch; next is make 8 bronze bushings as per sketch; and, then, it gives the total cost of those items $1306.78, and some more sums added. Those

work orders clearly indicate there was not work on the slides, do they not? A. I do not know whether that covers all the work that was done on them at the time. I do not know whether they covered overhead or not, which I have included otherwise. And, I do not know—there is nothing in there to show the cause. That is just about the time they were getting A-6250 into production.

Q. Now, the last sheet of these, Mr. Moise, in the summary, a designation of labor OH; wouldn't that indicate to you overhead was included? A. That is true. I noticed that. I said I did not know whether that was in there or not.

Q. You heard the testimony of Mr. Schmidt, did you not, to the effect that all this work done in his department was done on a standing order? A. Yes, sir. No, that was Mr. Aptekar, I think. I don't think Mr. Schmidt said that.

(2551) Q. Mr. Schmidt also testified to that effect, if I am not mistaken; whereas, these orders, don't they indicate to you, as an accountant, they were a special order for a special overhead job? A. I do not know, Mr. Farley, and I do not know whether most of those things—the reason for those was preparing them for the A-6250 shaft. It was perfectly natural to go over a machine when you are going into a precision job, where you weren't doing a precision job before; it is perfectly logical and good shop practice; and in that, you will notice those repairs which are not so extensive, and you will notice on guessing at the cost of completely rebuilding or overhauling a Ford shaper I have taken the sum of $500, which in my experience wouldn't go very far. I contend that there isn't any possible way with the information—

Q. (Interposing): Please, Mr. Moise. A. All right.

Q. If I might make the observation, I don't think you are properly here to make contentions. A. Possibly not, Mr. Farley, in this case, at least; not at that moment.

Q. Now, I would just like you to glance over these and refer to the dates of these overhauls. P-1 shows a date of 6/28/29; P-2, a date in 1928; P-3, also 1929; P-4, 1929; P-5, 1928; P-6, 10/15/29; P-7, 1/27/30; P-8, 10/18/28; P-9, 5/14/29; P-10, 12/14/28, and the orders attached to it running into 1929; P-11, 4/28/28; P-12, 5/23/30; P-13, 1/22/29; and, P-14, 11/16/28. My understanding is that you have not included the cost of any of these overhauls at **(2552)** all

in your sheet or Exhibit Z-6? A. No, I haven't included them in his comparison of maintenance and overhaul. I might say I have no data which I consider would make a completely satisfactory comparison of maintenance and overhaul cost for these two shafts, because there is nothing in the record which shows what the overhauls on shapers cost. And, it is out of the question to use a figure known on one side and ignore a figure which must be a considerable item on the other. It just means your comparison is perfectly absurd, in my judgment, and I wouldn't submit this as a part of our account.

The Master: Did you say you took into consideration overhead in this computation of maintenance?

A. No, I just took the—

The Master: Direct labor.

Mr. Spohn: You mean on Exhibit Z-6, your Honor?

The Master: Yes.

A. I just took the figures they had there; that is, just direct labor in the maintenance. It is just a flat figure of $500 for a minimum estimate of overhaul for the shapers; just thrown in there to show even with a minimum figure you would have added an item that certainly was big enough to be considered in a comparison. I don't think any comparison of this can be made. This is not intended as an accounting sheet, by me, for the purpose of obtaining a profit. I think under the circumstances it is impossible to make one.

The Master: Is your $500 overhaul estimate per shaper a rough estimate of the direct labor cost?

A. It is simply a very minimum cost of labor and material required **(2553)** to make any considerable overhauls. Mr. Schmidt testified about the things they did on there, and I believe he was interrupted before he got through, but I think he said they took the machine right down to the casting, changed bearings and shafts, and then someone interrupted him, and he didn't complete it. And, when these overhauls of the Melling lathes, of which they have the 21 sheets, if they cost $1665.00 apiece, and consist, to a large extent, of changing bushings, and so on, the $500 is simply an absolute minimum figure thrown in there to show something should have been included.

The Master: You are considering the cost of materials, then, with the maintenance and overhaul work on the shapers, but not with the Melling machines?

A. I am not including a cost of material, because I say—it might be cost of material—$500 I don't think would cover cost of labor. I used a minimum figure without reference to what it included. If you will notice, the labor on these is considerably more than that.

Q. The point is that you haven't included any figure of overhaul on the Melling lathes on the first page of your Z-6, except that you ascribe, according to the testimony of Mr. Schmidt, that all the overhauling was done by the maintenance crew in spite of the fact documentary evidence has shown, produced here, showing the overhaul was done on different orders than those testified to by Mr. Schmidt; isn't that true? A. I have allowed the full time of two men in the foundry tool room, probably connected with the foundry building which, in the two, amounts to $27,000. Now, Mr. Schmidt didn't say **(2554)** they were working on slides all the time. He said those men repaired slides. I would go a long way before I would attempt to claim this sheet, or the other, represents a fair comparison of overhaul and maintenance. I don't think it does. I don't think either one of them do. I wouldn't know how to get it from evidence presented.

Q. I refer you to sheet 6 of schedule 1. I think that forms a part of Exhibit C. Is that correct, Mr. Woehrle?

Mr. Woehrle: That is right.

Q. (By Mr. Farley, continuing): And, it shows a total of these extraordinary overhauls covered by these work orders that are listed there? A. Yes.

Q. Of some $23,579.00? A. That is true. That is not as much as I have added to Mr. Woehrle's account for the Melling.

Q. But, the figure you have added, you have added some $6,000 for the foundry tool room, then? A. No, I have added $27,000 for the foundry tool room, if you will look at the second sheet, also, and—in other words, while I don't consider the figures accurate, I don't think we have anything to go on. My charge against the lathes is about the same as Mr. Woehrle's, including the overhaul.

Q. But, if you included the sum as given on these work orders as additional to the day to day work of the men on the slides as testified to by Mr. Schmidt, your complete maintenance cost, then, on the Melling machines, would be larger than the $92,000 you have given on page 2 of your Exhibit Z-6. That is correct, isn't it?

(2555) The Master: You mean the $66,000?

Mr. Farley: No, if you added the 22.

A. Then, you would get about $98,000 or $88,000. That $88,000 you would add to that, if you included those things, and your comparison would be a little different provided you retained a minimum $500 for overhauls on the shapers when you were putting in $1665.00 overhaul on Melling lathes. Again I say I think the figures in here are unreasonable because they are not accurate, on either report.

Q. It would be practically 90,000 and not 88,000, if you added that full amount? A. I will take your word for it, Mr. Farley. Mr. Farley, may I say one thing in connection with this?

It must be recognized that had they been using shapers at about the time they got into big production on the A shafts, it is entirely possible they would have corresponding very special overhauls on them. Nobody knows. There isn't anything to indicate. Those machines happened to be there at the time to shift to another shaft.

Mr. Farley: No, I think that is volunteered, your Honor, please, and I believe it should be stricken.

The Witness: It is perfectly logical.

The Master: I think it is in line with the general subject that we are on, and I will let it stand. It simply means the plaintiffs have asked the question on re-direct examination, if it were stricken out.

Q. (By Mr. Farley): Well, I believe you testified on your direct examination here, Mr. Moise, that, if I understood you right,—you will correct me, I know, if I am wrong —that these overhauls (2556) were done because of the change from the model T to model A shafts? A. Oh, I did not say positively. I do not know why they were done. I say they may have been done for that reason. I said there was no conclusive evidence that they were done because they were worn out producing model T shafts.

Q. But, those overhauls were made, as those cards show, anywhere from a year and a half to two years after the machines had been used extensively on model A production? A. Some time after the production had started on that. But, if you will recall that there was quite a good deal of trouble changing slides, and so forth, and, therefore, there was a good deal of delay in getting—some delay in getting into production on the A shaft, I believe, some of the witnesses testified. That is, in the period, the early production of the A shaft, and before they got into really big production, most of that work was done; the really big production.

* * * * *

(2565) Q. Now, would you refer to your Exhibit Z-4, please?

Mr. Spohn: That is that depreciation.

Q. (By Mr. Farley, continuing): Now, as I understand this, Mr. Moise,—do you have a copy there, your Honor?

The Master: Yes, I have.

Q. (By Mr. Farley, continuing): On the first page in the year 1929 you jump the number of shapers from 22 to 31, and, also, as I understand your calculations here that is based on the assumption that nine shapers would be the equivalent of six Melling machines? A. That is so stated on the report. You will notice it says corresponding to six additional Melling machines. Thereafter there are listed nine shapers.

Q. Now, you heard the testimony, did you not, to the effect that the six additional Melling machines bought in 1929 were bought for the purpose of putting in a third operation? A. I heard that testimony, and also that they were used in production.

Q. Now, as I understand your method of figuring depreciation it is on the basis of the number of hours run by the machines, isn't that your system here? A. No, sir, it is on the number of machines on hand depreciating so much per year. We have no records as to the hours run by different machines; none whatever.

Q. Well, as a matter of fact, as I understand your calculation, when you compare output of 25 shafts per hour

on shapers to **(2566)** 37½ on Melling machines, in order to obtain an additional number of machines, doesn't that really boil down to figuring the machines on the number of hours they would run? A. It means that to produce a given production safely you would have to have more slower machines than you would fast machines.

Q. But, your calculation does not take into consideration the fact as shown by the Payne reports that the Walcott machines were found to be 40 per cent, or, rather, 60 per cent efficient, does it not? A. I have read the Payne report, but the Payne report was made during the period when the machines were being gone over as testified to by Mr. Schmidt.

Q. Will you please answer the question? Your calculation does not take that into account.

Mr. Spohn: If your Honor please, the witness answered the question.

Mr. Farley: Well, read the question and answer, please. I don't think I got an answer to that question.

The Master: Does your calculation take that into account?

A. You mean do I consider the speed indicated and the percentage of the time operated as shown by the Payne report? Because, I did not, for the reason stated.

Q. (By Mr. Farley, continuing): And, as your Exhibit Z-5 is merely a recapitulation of the calculations made on Exhibit Z-4, the answer would be the same there that you did not consider the Payne report or the relative efficiency or down times of the two machines? A. I did not consider the Payne report in that respect at all.

* * * * *

(2567) Re-Direct Examination by Mr. Spohn.

Q. When you testified in response to a question of counsel that you didn't consider the Payne reports, you testified yesterday concerning those Payne reports, did you not? A. I beg your pardon?

(2568) Q. I say, you testified yesterday concerning the Payne reports and the reasons why you didn't use them in your accounting? A. I think I did; yes.

Q. And, when you said you did not consider them, did you mean to say you didn't use them? A. I did not use them. I gave consideration to everything.

* * * * *

Q. Now, referring again to your Exhibit Z-6, that is the exhibit on maintenance and overhaul? A. I have it.

Q. Do your figures there set forth any overhead figures at all? A. In so far as the principal calculations are concerned, the figures I used, they do not consider overhead.

Q. Direct labor only? A. Direct labor only.

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APPENDIX
TO TRANSCRIPT OF RECORD.

Designated Portion of the Testimony of the Witnesses Otto H. Schultz, Frank Steinke, Bert Weisel, William Cunningham and Charles Gordon from Plaintiff's Exhibit 14—Patent Office Record, Interference No. 47,200—Herman W. Melling vs. Charles Gordon and Alfred Redlin.

OTTO H. SCHULTZ:—

(Q. 1, page 132, to and including Q. 22 and Answer, page 136.)

DIRECT EXAMINATION by Mr. Earl.

Q. 1. What is your age, residence and occupation? A. I am 38 years old, reside in Jackson, Michigan, 314 South Bowen Street; manager Jackson Motor Shaft Company.

Q. 2. How long have you been connected with the Jackson Motor Shaft Co. and in what capacities? A. Connected with them about seven years and a half, five years and a half as superintendent, the other two years as manager.

Q. 3. How long have you known Mr. Melling? A. About four years, I think.

Q. 4. Do you know Mr. Gordon? A. Yes, I know Mr. Gordon.

Q. 5. You have known him how long? A. About two and a half years, I think.

Q. 6. Did you ever have any business dealings with either of these parties? A. Yes, sir.

Q. 7. Kindly relate what they were. A. Why, with Melling, Melling does work on crank shafts we make. We have done business with Melling for the length of time I have known him. He has also made a lot of special machines for us, and business dealings with Mr. Gordon have been just those I have had on the cam turning machine and parts for same.

Q. 8. Are you familiar with the Gordon cam shaft lathe illustrated in this circular?

By Mr. Dennett: Question objected to. The best evidence is the Gordon machine referred to in the ap-

plication of Gordon & Redlin involved in this interference.

Q. 9. Kindly state what connection you had with machines of this character.

By Mr. Dennett: Same objection as to the preceding question.

A. In the early fall of 1919 or in the summer of 1919 a fellow by the name of Redlin called on us for the Erd Motor Co. of Saginaw, about machining cam shafts. He told me he had designed a machine to turn all cams at once and it was being made in Milwaukee by Mr. Gordon, so we went to Milwaukee in the early fall of 1919 and saw the machine working in a machine shop in Milwaukee. I don't remember where the shop was. It was then running on Nash cams and it turned a couple of cams for us and the machine looked all right. We got back and ordered two of those machines which were to be delivered in October. The machines were not delivered—the first machine was billed out the 31st of January and got in our plant, and Mr. Gordon's son accompanied the machine in and worked on the machine about three days. We had it set up on a Ford cam shaft job. It was impossible for him to make this machine work, and he said he would have to send it back to Detroit, which they did. They shipped the machine back and sent out another machine. I don't remember just the date of arrival of that machine, but it was a short time after that. This machine was set up and run it on the Ford job until—that was in 1920, until September, 1920, at which time we took the job off the machine and put it back on the rough grinder. We got another machine in April. Bought this machine equipped for the Lycoming cam shaft and worked it in a way until October. It has never been working on the job since. During this time after we bought the Lycoming machine, the machine would not work when it got here, and a Mr. Goddard was here for a number of weeks trying to get the machine to work. We were never able to turn the cam and get the shape close enough so we could run it on the finish grinders and have it right.

Q. 10. What efforts did you and Mr. Goddard make to cause these machines to work properly? A. We did

everything we knew how to make those machines work before we took the matter up with Mr. Goddard. He then sent in Mr. Goddard and we turned over the tool room and gave him a man and told him to stay right with im and help him make these machines work.

Q. 11. Do I understand the first machine never did work? A. The first machine worked and run cam shafts, but the class of work obtained from the machine, that came off the machine, was so bad we had to take it off the machine and go back to the old method of rough grinding for cost on the job to scrap was so high we couldn't afford to run the machine on the job.

Q. 12. You are now speaking of the first machine? A. Yes.

Q. 13. The one that Mr. Gordon's son tried to operate? A. Mr. Gordon's son gave the job up. I think he came back with the second machine the second time, that is, Mr. Gordon's son. The second machine I think he came back with for a short time. He was sent I think some place else, and I think there was another mechanic Mr. Gordon sent in the meantime. I don't remember his name.

Q. 14. You are speaking of the first machine as the one that was on the Ford cam shafts? A. Yes.

Q. 15. And the second machine was the one— A. On the Lycoming cam shaft job.

Q. 16. What were the results of the Lycoming job? A. We never did get any results on the Lycoming job, would run for about a quarter of a day and then have to go after something to repair it.

Q. 17. When you speak of scrap, what does that mean? A. That means any cam shaft or any shaft that will not finish.

Q. 18. If you will kindly explain why they would not finish. A. As I remember the Lycoming job the big trouble with that was on one side of the nose of the cam. The turning machine left a large hump. We are supposed to have 30/1000 stock finish, and these cams, on those humps, there would be as high as 90/1000 finish, and we had some we couldn't ship and they were scrapped. On the Ford cam, the biggest objection to that was that the masters would not hold the tool in position and the tool would drop back and take a straight cut across the nose about an eighth of an inch deep, dig out a place in the

nose cam the width of tool and about an eighth of an inch deep. We also had considerable trouble on the Ford cam in trying to keep the line up of the shafts with the noses of the cams. This line would shift during the day, and then we would have to stop and line the job up again.

Q. 19. Where are those machines now you purchased? You still have them? A. We still have them setting in a shed back of the plant.

Q. 20. Did you personally have anything to do with Mr. Goddard when he was working on these machines. Did you observe his efforts and what he did? A. Yes, I did. Mr. Goddard's efforts seemed to be to change the masters so they would take care of the errors the machine made in turning the cam on the Lycoming job.

Q. 21. Did he do any work on the Ford job, Ford machine? A. I don't remember so much about what he did on the Ford machine, but I know one thing we did was to put some little springs on the back of the Ford machine which tended to hold that tool up better. That was done by our man Weisel.

Q. 22. As I understand the ultimate result was the scrap was so great you felt forced to discontinue this machine in which you had invested? A. Yes, sir.

(Q. 45, page 140, to and including Q. 72 and Answer, page 145.)

Q. 45. I show you the patent drawings of the Gordon & Redlin application involved in this interference and ask you if these drawings illustrate the kind of machine that you saw working in Milwaukee in 1919 and the kind of machine you purchased? A. Yes, sir.

Q. 46. This is the same kind of machine? A. The same type of machine.

Q. 47. How about that machine you saw working in Milwaukee in 1919 of Gordon & Redlin's from your investigation of that machine? Was that working satisfactorily in the sense that it was doing the work the machine was called to do? A. Yes, but I only saw one shaft turned and I didn't check the shaft for contour, but the shaft looked all right when it came out. I didn't check that shaft or go into it at all. I just watched them run one shaft.

Q. 48. On the basis of what you saw of the work of that machine you ordered a machine of that kind? A. I think we sent Mr. Gordon prints of our different shafts, and after he said he could turn those shafts, we ordered two of the machines.

Q. 49. That order for two machines was given at the same time? A. I think so. I think I have got the order in my pocket.

Q. 50. Afterwards, you ordered another machine? A. No, sir, we never ordered but two machines. We might have ordered another machine when they sent that first one back. I don't remember that. They sent that back on their own accord. I don't think we put in another order for that machine.

Q. 51. As far as you know? A. We only ordered two machines.

Q. 52. These were both ordered prior to taking this matter up with Melling of his making a machine? A. Yes.

Q. 53. Have you that order in your pocket? A. Yes, in my overcoat pocket there is a bunch of papers. That is our copy of the order. You notice that second machine was ordered for Chandler but we afterwards put Lycoming on.

Q. 54. All right, much obliged. Do you know anything about the use of Gordon & Redlin machines at the present day for turning cam shafts? A. No. I understand some people are still using them. Some that bought them are not using them. I never have seen any of the Gordon & Redlin machines in operation in any other place but our own plant and that one time in Milwaukee.

Q. 55. Did you personally make any investigation of these Gordon & Redlin machines which your company had to see what the trouble was with them that gave you trouble? A. Why, on the first machine I did.

Q. 56. What was the trouble you found with the machine that gave you the trouble in producing the cam shafts in the form you desired to produce them? A. In the first place, as I remember it, the clutch on their machine was no good. Another thing, the masters were not right, and I say as I said before we used a larger spring to try and hold that tool from cutting across the nose of the cam. We installed those springs at our own plant.

Q. 57. When you installed those springs did that remedy the defects? A. To some extent but not entirely.

Q. 58. What particular springs do you refer to and you refer to the Gordon & Redlin patent application drawings and the reference numerals on the springs? A. On that spring. Let's see. I don't remember whether we changed that spring or not, but we changed the other spring. Where is that spring that goes straight out the back? Yes.

Q. 59. You changed spring No. 49? A. Yes. I know we changed that one. I don't remember about the top.

Q. 60. You don't know about the spring No. 59? A. No. We changed most of those things on the say-so of their men. Another thing that was done with the masters on this first machine, we made up a master with sharp points to this nose. This is 44. They came over there and cut those points off that master so the blow would not be so strong when they dropped over that sharp point. Those were all cut off.

Q. 61. Did you pay any attention to those machines as to their general make-up as machines for quality of material used, accuracy of construction work, etc? A. Yes. The first machine as I remember came in there was about the rottenest built machine that was ever put in our plant.

Q. 62. Could the second be described more favorably or less favorably? A. I don't remember about the second machine so much on that particular point.

Q. 63. But the principle of operation in the machine as shown in the Gordon & Redlin application, the swinging arm controls in its movements swinging movements by a cam, and a cutting tool the angle, cutting angle of which was controlled by a special cam? A. Yes. The machines as I remember them were too light to work as they should. Mr. Goddard, one of Mr. Goddard's jobs was to put a steady rest between 24 and the table 5. Another thing, these rollers would not stand, roller No. 53 would not stand up. We changed this and changed this on the machine. That was an everyday job. Afterwards, the Lycoming cam shaft, he put a fly wheel on to keep the machine going right. I don't remember what he said that would do.

Q. 64. What in your judgment these matters related, to imperfections of the actual mechanical construction of these particular machines as distinguished from any difference in principle of operation? A. Found out that putting that spring on the back of that would not help it any. It would help to some extent, but would not correct the imperfection in the machine.

Q. 65. These particular machines? A. In any Gordon machine.

Q. 66. I thought you only had experience with these particular machines and didn't know about other Gordon machines? A. You said that was the same type of machine.

Q. 67. That is what I meant, but as I understood your answer just now in saying putting a heavier spring 49 in a Gordon machine would not correct an error which you found in the machines which you had in use, in holding the tool to the work. Is that right? A. Yes, but you asked me a question if it corrected the imperfections in the building of the machines.

Q. 68. Only in so far as you had referred to putting in a spring, a stronger spring. A. I said that spring did not correct any bad workmanship on the machines, that is if the machines were built, were not built right, that spring was not put on there to correct the building of the machine. It was put on there to correct the principle of the machine, which it couldn't do. In other words, you don't keep the cutting angle of your tool right and the spring was put on there to try to keep that tool from cutting across the nose of the cam on account of the cutting angle not being right, and it dug into the cam and cut across the nose because the cutting angle was not correct and couldn't keep it correct. The only thing to do was to put that spring on there to hold it up until it got over that nose. That was not an imperfection in the building of the machine—all machines would be built like that. Most of the other work done on the machine was to try and correct the rotten workmanship that was put on the machine with the exception of the Lycoming machine. On the Ford machine most of the work was to correct the rotten workmanship on the machine.

Q. 69. I don't think that we quite understand each other. You misunderstood my question. You had said you put on a heavier spring for the spring 49. A. Yes.

Q. 70. My question was intended to ask if putting a heavier spring on for spring 49 was intended to change the principle of operation of the machine.

Mr. Earl: The witness has just said they attempted to remedy defects in the principle.

Q. 71. That is the point my question was aimed at. As originally put there was whether the principle of the machine remained the same after you had changed the spring and after other things had been done to the machine, or whether the changes that were made changed the principle of operation of the machine. A. No change we made would change the principle of operation of the machine. That was not your question though as I remember it.

Q. 72. Do you know who built those Gordon & Redlin machines you bought? A. Yes, I know who built them, but can't remember who they are—Eastern Production Co. of Detroit.

BERT WEISEL:—

(Q. 1, page 190, to and including Q. 55 and Answer, page 198.)

DIRECT EXAMINATION by Mr. Earl.

Q. 1. What is your age, residence and occupation? A. My age is thirty-two; residence 407 West Main Street, Jackson, Michigan; occupation, tool designer.

Q. 2. How long have you been engaged or employed as a tool designer? A. Three years.

Q. 3. What was your work before that time? A. Tool making.

Q. 4. Where are you now employed? A. Jackson Motor Shaft Company.

Q. 5. The term of your employment there? A. About seven years.

Q. 6. Prior to that time? A. American Gear Company.

Q. 7. As a tool maker? A. Yes, as a tool maker.

Q. 8. For about how long in all as tool maker and designer? A. About thirteen years.

Q. 9. Are you acquainted with both Mr. Melling and Mr. Gordon? A. Yes, sir.

Q. 10. How long have you known each of these? A. Mr. Gordon I know only by acquaintance since late in 1919, I think.

Q. 11. How long have you known Mr. Melling and in what connection? A. I have known Mr. Melling personally for seven or eight years.

Q. 12. Do you have any knowledge of a cam shaft turning lathe known as the Gordon? A. Yes, sir.

Q. 13. Do you have any knowledge of a cam shaft turning lathe known as the Melling? A. Yes, sir.

Q. 14. Have you had any experience in the operation of the Gordon machine? A. Yes, sir.

Q. 15. Kindly state what that experience was in a general way. I am not asking for details at this time, but merely in general. A. My first experience with a Gordon machine was when the machine was first set up that the lift on the tool rotating cams were so high that the rollers, when dropping from the top of the nose, would cause considerable trouble. It was not practical and would not work so the first machine was shipped back to Detroit and was overhauled and we received that machine back, and still it would not work.

Then Mr. Goddard was brought on the job at the Motor Shaft plant and he ground this high lift off the tool rotating cams which made the machine run better but yet the machine would not produce accurate work, the surface of the cams being very irregular, which they tried to overcome by altering the master cam.

Q. 16. I show you a copy of the drawings of the Gordon & Redlin application involved in this interference. Are you able to read drawings? A. Yes.

Q. 17. Is the Gordon & Redlin machine you referred to illustrated in these drawings? I don't intend this question to mean that it be the same in all particulars but in general. A. You did not intend it in all particulars?

Q. 18. No; in general, was it the same? A. Yes.

Q. 19. Kindly point out the cam that you refer to as the master cam. A. The tool rotating master is this

marked 44 (indicating) and the master cam that they altered is marked 43 (indicating).

Q. 20. Did you have to do with the operation of this machine? A. Well, not in the operation of the machine, but in a way of overhauling and repairing, I helped Mr. Goddard.

Q. 21. I do not just understand what he was attempting to do in changing the cam 43. Did you know what his object was in making those changes? A. The object in making those changes was the rough surface of the cam and they altered this cam to overcome the error in the work being produced, which was not accomplished. Due to cutting off the nose of the tool rotating master which gave more tool resistance in turning the nose, it became very often the case that the nose was torn so that the shaft was scrapped.

Q. 22. Was an attempt made to operate the machine with the sharp cams that you have spoken of? A. Yes, sir, it was attempted but never worked.

Q. 23. Are any of the cams before you on this desk like or similar to the sharp cam you spoke of? A. Yes, sir.

Q. 24. Will you indicate? A. This is the nearest. (Witness refers to Melling's Exhibit 20B.)

Q. 25. Will you kindly mark on this cam with your initial the changes that were made as near as you can? A. It was about that; I would not say it was exactly that.

Q. 26. Please put your initials on that.

(The witness has marked Melling's Exhibit 20B and indicated the mark with "B. Weisel.")

Q. 27. Do you know the reason for cutting off or modifying these cams that were on the first Gordon & Redlin machine delivered to you?

Mr. Earl: Did you understand the question?

A. Yes. There were several reasons for that. The main reason was that the roller pins would not stand the severe shock of dropping the distance from the point of the nose to the base of the cam under the heavy spring tension which was required to keep the tool in contact with the work. The reason for such heavy spring tension was brought about by the tool while coming up the nose of the cam getting at such an obtuse angle that the cutting re-

sistance was so great that it required extra heavy spring tension, and different angular relation of the tool to the work at this point of the cam was the cause of considerable of the scrap from the Gordon & Redlin machine.

Q. 28. Please state in general what efforts were made to overcome these objections, that is, the extent of the efforts.

Mr. Dennett: Question objected to unless relating to efforts of Gordon & Redlin.

Mr. Earl: It is all right for you to go ahead and answer the question.

A. Mr. Gordon sent a man of the best caliber to take care of such troubles. This was Mr. Goddard I have spoken of before who spent considerable time trying to make these machines work. Mr. Goddard worked very faithful, trying in every way possible to make these machines operate.

Q. 29. You have spoken of "machines"; I believe only one machine had before been mentioned. How many have you had experience with? A. Two.

Q. 30. Did Mr. Goddard work on both machines? A. Yes, sir.

Q. 31. I do not know that it has been definitely brought out where this took place. A. What are you referring to?

Q. 32. Your experience with these machines. A. At the Jackson Motor Shaft Company, at Jackson, Michigan.

Q. 33. What assistance, if any, did the Jackson Motor Shaft Co. render Mr. Goddard in this connection? A. While Mr. Goddard was at the Jackson Motor Shaft Co. he was given any assistance asked and was also given free use of the tool room to make any change that he required.

Q. 34. Was any assistance offered in the way of labor? A. Well, didn't that just cover it? He was given any assistance that was asked and he had one man working with him continually when he needed him.

Q. 35. Do you recall about how long a period this extended over? A. I am not positive, but I think about eight months.

Q. 36. Do you recall about when these machines were received by the Jackson Motor Shaft Co.? A. Some time in January, 1920, I think.

Q. 37. Are the machines still in operation? A. They are not.

Q. 38. When was the operation of these machines discontinued, or the attempt to operate them discontinued? A. I could not say definitely.

Q. 39. Can you state why the use was discontinued? A. The use was discontinued on account of their scrap percentage going so high. I dare say the scrap percentage of the Gordon & Redlin machine over the old method was ten to twelve per cent.

Q. 40. Did you return to grinding when you discontinued the use of these machines? A. We did.

Q. 41. What in your judgment was the cause of there being so much scrap with the Gordon & Redlin machine?

Mr. Dennett: Question objected to. Witness is not qualified to give testimony in regard to the principle and operation and construction of machines as distinguished from tools.

Mr. Earl: You may go ahead with your answer.

A. Well, the tool not maintaining the proper cutting angle would cause the tool to tear through the nose and scrap the cams, and the irregular surface caused by this error would also cause trouble in lining the cams on the cam grinder so that they could save what they did.

Q. 42. Can you produce a sample of the cam shafts cut on the Gordon & Redlin machine in your factory, or the Jackson Motor Shaft Company? A. Yes, sir.

Q. 43. This is the one? (indicating) A. That is the one, yes, sir. We have several of them.

Mr. Earl: The shaft produced by the witness is offered in evidence as Melling's Exhibit No. 36.

Q. 44. Is that a shaft such as you have referred to as scrap, or is it a good shaft? A. This is scrap.

Q. 45. Do you know what automobile engine that shaft was intended for? A. Yes, sir, the Lycoming.

Q. 46. While you were operating these machines were they run continually? A. They were not.

Q. 47. Kindly state the reason for their not being run continually. A. The reason the machines were not run continually was that they were being repaired.

Q. 48. When they did run, was the work resulting other than the so-called scrap true to contour? A. It was not; in fact, we never did any shafts on the machine that were true to contour.

Q. 49. On what portion of the cam did the most trouble occur? A. While turning up the side of the nose, and this trouble also occurred around the base circle of the cam, but not as great as at the point where the tool became so clearly out of cutting angle. The irregular surface of the base circle of the cam was caused by the resistance of the tool while turning the nose of the cam near to it. In fact, we had several cams to my knowledge that would not clean up in the finish grind directly opposite the nose.

Q. 50. I wish you would state a little more specifically what might be understood from "cleaning up in the finish grind," having in mind that the parties likely to consider this record have not had any practical experience. A. This was on account of the tool marks and the irregular surface of the cam.

Q. 51. You have spoken about the tool getting into an obtuse angle in relation to the work. What is the normal angle in this Gordon & Redlin machine of the tool to the work? A. As I understand this question, the normal angle of the tool to the work on the Gordon & Redlin machine is the cutting angle and is at right angles with a perpendicular line while turning the base circle.

Q. 52. Then I take it that this angle is not maintained? A. This angle is not maintained.

Q. 53. Please state what the effect of this variation in cutting angle has in the Gordon & Redlin machines which you saw in operation. A. I could not state exactly what the variation was but I would say around 20 to 30 degrees.

Q. 54. I apparently did not make my question clear. What I had in mind was the effect this variation in cutting angle had on the work. A. That was explained several times.

Q. 55. Never mind; just consider that I am dense about it. A. The effect of this cutting angle is that it causes more resistance to the tool at that point when it becomes out of angle which causes an error in the contour of the cam. This error is the reason that the cams do not clean up in the finish grind. The Jackson Motor Shaft Company,

while using the Gordon & Redlin machine, tried in every respect to use these machines if possible. They even went so far as to add considerable more stock on these cams trying to see if they could not use them, which proved very unsatisfactory.

Mr. Goddard, while at the Jackson Motor Shaft Company plant, made a complaint that the reason the Gordon machine did not work was because we had it standing near a grinder. By this they moved the machine and new tool holders and liner bushings, and all the necessary parts that Mr. Goddard thought necessary, were put on this machine and yet it didn't do any different work after he had it overhauled.

(XQ. 84 and Answer, page 203.)

CROSS EXAMINATION by Mr. Dennett.

XQ. 84. You spoke about Melling's machine being a lighter machine than the Gordon & Redlin machine at the Jackson Motor Shaft Company works. In doing the work with the Gordon & Redlin machines was all the excess stock taken off at one cut or attempted to be taken off with one cut? A. Yes, sir.

(XQ. 100, page 205, to and including XQ. 102 and Answer page 206.)

XQ. 100. What kind of tools were used by the Jackson Motor Shaft Company on those Gordon & Redlin machines; the same kind of tools that were illustrated and described by the Gordon & Redlin application involved in this interference which are illustrated by Figs. 6 and 7 of the drawings as generally circular in form with a notch cut out and which are described in the specification of the application papers as follows?

> "The tool holders may be provided with cutting tools of any suitable form, having cutting edges disposed radially to and their points at the center of the axis of oscillation.
>
> "As shown in Figs. 3, 4, 5, 6, 7 and 14, circular or segmental tools 37, are fitted and adjustably held in corresponding recesses in the sides of the tool holders by bolts 38, passing through the tool holders at a slight

inclination to their axis and centrally threaded in the tools. The tools are formed with angular notches or recesses in their peripheries to provide cutting edges which are disposed radially both to the axis of the tools themselves and of the tool holders, with the points at the centers of the tool holders. The tools are formed with peripheral helical teeth engaged by adjusting screws 39, swiveled in holes or sockets formed in the tool holders transversely to their axis. The slight inclination of the axis of the tools to the axis of the tool holders, as shown in Fig. 5, provides for the proper clearance of the tool below its radial cutting edge 40."

That is to say, would the tools used in those Gordon & Redlin machines have their cutting edges disposed radially to the axis of the tool so that they are end cutting tools as distinguished from point cutting tools? A. Yes, sir.

XQ. 101. Did and do the machines of Melling which are at the Jackson Motor Shaft plant do their cutting on the sides of the cam or cams in the same manner in that respect as the tools of the Gordon & Redlin machines? That is, as a general proposition, without making any distinction that you may have in mind as to proper cut. A. Yes, they have an end cut in that respect, but they do not work the same.

XQ. 102. End cut on the ends of the cams, you mean? A. Yes. They could not cut it otherwise; they have to start at the end and turn it some way.

(XQs. 115 and 116 and Answers, page 210.)

XQ. 115. Where were the cam shafts made that the Jackson Motor Shaft Company used on the Gordon & Redlin machines while it was using those Gordon & Redlin machines? A. On the Ford shaft, I cannot state this answer as the Ford factory furnished the shafts. As to the Lycoming shaft I cannot state where they were purchased at the time we were using the Gordon & Redlin machine.

XQ. 116. How many Gordon & Redlin machines do you personally have knowledge of that were used by the Jackson Motor Shaft Company of Jackson, Michigan? A. Two.

(XQ. 121, page 211, to and including RDQ. 150 and Answer, page 219.)

XQ. 121. And can you testify of your own knowledge that on those cam shafts which were torn through the noses that the tools on the Gordon & Redlin machines were properly ground and sharpened and otherwise in proper condition for cutting cam shafts at the time these noses were torn off? A. Yes; and I can recall times when these tools were ground by a representative of the Gordon Company, being Mr. Goddard, he grinding these tools himself.

XQ. 122. Were the noses ever torn off except when Mr. Goddard ground the tools? A. Yes, sir.

XQ. 123. Now, in those cases where the noses were torn off when Mr. Goddard did not grind the tools, were the tools in proper shape for the work they were intended to do as to sharpness and general condition otherwise? A. These tools were ground only on one face; the only chance for error in grinding these tools would be merely in the rake angle.

XQ. 124. That was just the question that I asked; whether or not the tools were properly ground and in proper condition, as a matter of fact, when the noses were torn off and Mr. Goddard did not grind the tools. A. This question I could not state definitely as I was not the operator of the machine but many times I ground the tools for these machines according to Mr. Goddard's instructions; but whenever I had been called to the machines when they were having this trouble I found the tools in as good condition as a man operating a machine and having knowledge of grinding tools could do without being ground by a tool man or by extra expense of being ground in a special fixture.

XQ. 125. Did you examine the cam shafts carefully which were being cut at the time the noses were torn off, as you referred to? A. Yes, sir.

XQ. 126. Was there any indication that excessive metal to be removed from the nose portions of those cams as compared with other cams that were being cut? A. In regard to the Ford shaft, when we first received the Gordon & Redlin machine we had excess stock on the nose. This was objected to and the Motor Shaft Company arranged with the Ford people to have their dies changed and they

made a set of lock dies which produced the best forging to my knowledge while with the Motor Shaft Company, and yet we had the same trouble of tearing through the noses.

XQ. 127. How many of those cam shafts produced by these lock dies ever came in to the Jackson Motor Shaft Company plant prior to the time that Mr. Goddard had left the plant in connection with the Gordon & Redlin machines? A. I could not state the exact number, but it was several thousand.

XQ. 128. And during the period from the time the Gordon & Redlin first machine was installed in the Jackson Motor Shaft Company plant to the time of discontinuance of use of the Gordon & Redlin machines at that plant, about how many cam shafts were turned on the Gordon & Redlin machine altogether, if you can recall? A. I cannot state this question but it could be found on the records at the Jackson Motor Shaft Company.

XQ. 129. And while the Jackson Motor Shaft Company was using these Gordon & Redlin machines and prior to the time that they commenced using the Melling machine, were they also finishing cam shafts by the methods of rough grinding to which you refer on the direct examination? A. Yes, sir.

XQ. 130. And when you testified on your direct examination that the scrap of the Gordon & Redlin machines over the old method of grinding was ten to twelve per cent, you meant while the two methods were being used at the same time at the Jackson Motor Shaft Company shop here at Jackson, Michigan? Did you or did you not? A. I did not. When we received the Gordon & Redlin machine we stopped our Ford job on the grinders expecting great results from the Gordon & Redlin machine but when we could not get production on the Gordon & Redlin machine our only resort was to go back to the old method of grinding.

XQ. 131. Did the Jackson Motor Shaft Company actually produce cam shafts by the rough grinding method or the old grinding method at the same time that they were using these Gordon & Redlin machines and as a part of the operations on the same kind of cam shafts and the same batch or shipment of cam shafts? A. Not to my knowledge.

XQ. 132. Do you know whether the excess material to be reduced from the noses of the cams on these cam shafts

is increased as the drop forging dies wear or is it decreased? That is, on the nose. A. I should say this would be decreased.

XQ. 133. Referring to this Melling's Exhibit 36; this has eight cams on it disposed in different angular relation from any point taken as a point of reference. Wouldn't it be probable that one or more of those cam noses on the rough shaft as it came from worn dies would have excess material over what a cam shaft made in the same set of dies when new would have? A. I should not think so.

XQ. 134. When a Gordon & Redlin machine tore the nose off from one cam, it tore the noses off from every cam on the shaft in the machine, didn't it? A. It did not.

XQ. 135. Do you know what caused this selective action of the Gordon & Redlin machine to tear the nose off one or more cam shafts and not tear the nose off from another or others? A. This is caused by the tool being out of cutting angle and the variation in the stock which causes this trouble may be in the straightening of the shaft. This being the case the stock would not be uniform at all points, which could not be expected from a forging.

XQ. 136. Did the Jackson Motor Shaft Company make any physical or chemical tests of the material of these cam shafts from which these noses were torn by the Gordon & Redlin machines to ascertain whether there was an inferiority or a departure from any specifications of the material used in them? A. The Jackson Motor Shaft Company did not analyze any material, to my knowledge, at that time, or they do not analyze any materials in their forgings used at the present time.

XQ. 137. Then, they made no physical tests of the characteristics of those forgings? A. They did not.

XQ. 138. Did you ever personally see a nose torn off from a cam as you have testified when the cam was being turned in the Gordon & Redlin machine so that you personally observed what happened? A. Yes, sir.

XQ. 139. Now, just state precisely what you saw happen in the Gordon & Redlin machine when the nose of a cam was torn off during the operation of the machine. A. This, as I saw it happen, was a snap which indicated that the tool rotating cam roller left the cam at this point, there being nothing but the spring to hold it in contact.

XQ. 140. If the spring to which you refer had been powerful enough to hold the roller in contact with the cam to which you refer, in your opinion would the nose have been torn off from that cam? A. Mr. Goddard, while at our plant, tried different spring tensions on this machine which produced no better results.

XQ. 141. How many times did you see the noses of cams torn off by one of these Gordon & Redlin machines while they were being operated at the Jackson Motor Shaft Company plant? A. I have seen several of them, not knowing the exact amount.

XQ. 142. Now, when you speak of these noses being torn off, you mean that the cutting tool or cutting tools cut them off, don't you? A. No, they do not cut them off. The tool getting out of angle and having such great resistance at this point causes them to tear through the noses. Now, this does not occur all the way across the nose; for instance, you see it would turn along the surface of the cam 1/16 of an inch, then this snapping action would take place and tear a place through the nose of the cam, and then proceed along the surface of the cam a little further and repeat this operation. And maybe this same operation would occur as high as seven or eight times while going across the width of the cam.

XQ. 143. Do you recall how many revolutions of the cam were required to pass the Gordon & Redlin tool entirely across the cam from one face to the other with reference to the cams to which you refer in your last answer where you said that a certain action might occur seven or eight times in the passage of the tool across the face of the cam? A. As there is no plate on the Gordon & Redlin machine indicating the required feed per revolution, I could not state how many revolutions the shaft made in turning the width of the said cams.

XQ. 144. But the seven or eight times mentioned by you when the action mentioned by you took place, as I understand, did not account for the entire number of revolutions, taken to cut the cam. In other words, I understood from your answer that the tool would cut all right at places but would not cut all right at other places while cutting the same cam, and those places referring entirely to cutting around the point or nose of the cam. Did I understand you correctly? A. Yes, sir.

XQ. 145. You have referred to the Gordon & Redlin tool, or tools on those Gordon & Redlin machines, not maintaining a proper cutting angle. You do not mean by that the angle known as the rake angle or the angle known as the clearance angle, do you? And by these angles, rake angle and clearance angle, I am using these expressions as defined in the text books and accepted authorities and as also testified to by an expert Professor of Mechanics called on behalf of Melling in this case; and if there is any possibility of your misunderstanding the sense in which I am using these words, say so, and I will have you supply your own definitions. A. I do not just understand your terms.

XQ. 146. By rake angle I mean the inclination of the cutting edge of the tool 37 of the Gordon & Redlin application involved in this interference as described in the Gordon & Redlin application involved in this interference, which states on page 5 of the specifications that the tools, referring to these tools 37, are formed with angular notches or recesses in their peripheries to provide cutting edges which are disposed radially both to the surface of the tools themselves and of the tool holders with the points at the centers of the tool holders. What I mean by rake angle is the angle that the cutting edge of that tool makes with the surface of the work to be cut and what I mean by the clearance angle is the inclination of the axis of the tools to the axis of the tool holders which the specification says provides for the proper clearance for the tool below its radial cutting edge.

In other words, the rake angle and the clearance angle to which I am referring are to be measured in a direction parallel with the axis of the work to be cut, whether it be cam shaft or other shape, and the angles themselves are to be determined by measuring from the surface of the work to the face of the cutting edge of the tool for the rake angle, and for the clearance angle is to be measured from the face of the work below the cutting edge of the tool to the tool.

A. The clearance angle is not maintained.

Mr. Earl: Now answer as to the rake angle. A. Well, the rake angle is ground on your tool but the top angle of your tool is also in error.

XQ. 147. Looking at Fig. 5 of the Gordon & Redlin drawings of their application involved in this interference,

you will note that the tool is set in a tool holder, the tool being numbered 37 and the tool holder being numbered 34, and that the tools are bolted to the tool holders by bolts 38, thereby maintaining the tools in fixed relation with their respective tool holders at all times.

In such a construction, is there any possibility of the rake angle, as I have defined it, and the clearance angle, as I have defined it, changing its relation to the work in the machine illustrated and described by the Gordon & Redlin application involved in this interference?

Mr. Earl: The question is objected to as a misstatement of fact. There is no warrant for it in the Gordon & Redlin drawings or specification.

A. The rake angle will not change but the clearance angle is not held by the bolts stated, but the clearance angle works in accordance with their tool rotating master cam on the back of the machine.

XQ. 148. Now, in addition to the rake angle and the clearance angle as defined and pointed out in the specification of the Gordon & Redlin application, another angular position or relation of the tool to the work is recognized and that is provided for by the tool 37 being mounted in the tool holder 34 which means including a cam 44 for changing the angular relation of the edge or cutting edge of the tool to the work as the work is revolved, so that the tool will be presented to the work in a proper position for doing its work as this tool must be presented to cut the work in such a manner that the cutting edge of the tool does not become tangential to the work to be cut.

You recognize this construction in the drawings of the Gordon & Redlin application before you as being the same general construction contained in the Gordon & Redlin machines at the Jackson Motor Shaft Company plant, do you not? A. What was the first part of the question? (Reporter reads question.) They are.

Mr. Dennett: Cross examination closed.

RE-DIRECT EXAMINATION by Mr. Earl.

RDQ. 149. The Gordon & Redlin tool 37 of the Gordon & Redlin application has a surface marked 40. Do you refer to that surface as the rake of the tool? A. The surface 40 is the rake of the tool to my knowledge.

RDQ. 150. What is the clearance of the tool, as you understand it? A. The clearance angle of the tool is the angle between the surface of the cam and the heel of the tool.

(RDQs. 153 and 154 and Answers, page 220.)

RDQ. 153. Are these cutting and clearance angles maintained in the Gordon & Redlin machines with which you are familiar? A. They are not.

RDQ. 154. Referring to Fig. 14 of the Gordon & Redlin drawings, the part marked 40 appears to be inclined. Is that what you mean by rake? A. Yes, that is the rake angle.

(RDQ. 166, page 222, to and including RDQ. 177 and Answer, page 224.)

RDQ. 166. Do you recall what the production was at its best with the Gordon & Redlin machine used in your factory? A. I cannot recall in my mind any one full day's production on account of tool troubles and other troubles.

RDQ. 167. Were there any parts to remove from the shafts produced on the Gordon & Redlin machine when they were taken from the machine? A. Yes, there was always a flash on the edge of the cam which was broke off by the tool corresponding to the shape of the cam and this was about 1/32 of an inch thick, or in case of real sharp tools it might be a little less, but they were always on the shafts and had to be removed, which took extra labor.

RDQ. 168. Were such "flashes" left on the work turned out by the Melling machines? A. They were not. We don't even have to file the burrs on the shafts as we did from the rough grinders.

RDQ. 169. What, if anything, limits the speed on the Gordon & Redlin machine? A. My answer to this question would be that the tool rotating arm roller could not follow the master cam.

RDQ. 170. What have you to say as to the relative amount of work on the finish grinding on the cam shafts turned out by the Melling machine and those from the Gordon & Redlin that you attempted to operate?

Mr. Dennett: Question objected to as incompetent, inadmissible, immaterial and irrelevant to the issues of this interference.

A. You want that answer?

RDQ. 171. Yes. A. I could not state the exact number of shafts more that is produced now off the Melling cam turning machines on the grinders but as I remember it, on the Ford job which was run on the Gordon machine fifty shafts per day from the finish grinder was about the best result accomplished. When we run this Ford shaft on the Melling machine the finish grinder's production for a ten hour day was eighty shafts. Of course, having to leave more stock on the shafts turned on the Gordon & Redlin machine and the fault of having to favor these cams on account of irregular surface made this great difference in production.

RDQ. 172. Did you ever see a cam shaft turned on the Melling machine in which the nose had been torn off? A. No; and this feature is impossible, as the tool is held in relation to the cam by the tool rotating master.

Mr. Dennett: The answer after the word "No" is objected to as volunteered, argumentative and not responsive to the question, and is further objected to for the reason that the witness on his examination heretofore has shown that he is not qualified to express any opinion upon the relation of the tool to the work in the Melling machine.

RDQ. 173. Was the feed on the Gordon & Redlin machines changed while in your factory? A. I could not state positively but I think Mr. Goddard tried every possible way to overcome the troubles.

RDQ. 174. You have been asked about the materials in the cam shafts on which these machines operated. Did you ever have any complaints come back to you because of the use of improper materials in the cam shafts? A. No, sir.

RDQ. 175. You were examined yesterday by Mr. Dennett as to there being pantograph action in the Gordon & Redlin machine. Is there, in your opinion, such an action in that machine? A. If there is, I cannot see it.

RDQ. 176. What is the purpose of pantographs? A. The purpose of pantograph is the reproduction of an object, either in enlarged form or smaller, of the same object.

RDQ. 177. Is there anything reproduced in the Gordon & Redlin machine, considering the action on one piece of work and in a series of successive pieces? A. No, there is not.

(RDQ. 183, page 224, to and including RXQ. 193 and Answer, page 226.)

RDQ. 183. As I understood your testimony, you personally assisted in grinding and keeping up the tools of the Gordon & Redlin machines? A. Yes, sir.

RDQ. 184. What have you to say as to the efforts to maintain those in best possible condition? A. We exerted every effort to maintain these tools for the Gordon & Redlin machine at proper cutting angles as instructed by Mr. Goddard and Mr. Gordon's son.

RDQ. 185. I had in mind particularly the grinding of the tools, keeping them sharp and properly ground. A. The tools were kept sharp and properly ground.

RE-CROSS EXAMINATION by Mr. Dennett.

RXQ. 186. Referring to these photographs Melling's Exhibits 18B and 18D, the cutting tools shown thereby are not shown as removing any material from the cam, are they? A. They are not.

RXQ. 187. Referring to the Gordon & Redlin drawings of their application involved in this interference, and particularly Fig. 14 thereof, you will notice a screw 39 which the specification describes is for the purpose of adjusting the tool. Now, in that Fig. 14 the cutting edge 40 of the tool is shown substantially horizontal when considering the relations of the tool to the sheet of drawings. By turning screw 39 and rotating the cutting tool 37 about the bolt 38, do you call that adjusting the rake angle of the tool? A. I would not.

RXQ. 188. You in your re-direct examination were referred to the drawings of the Gordon & Redlin application and as I understood you, you said that the bevel illustrated below the cutting edge 40 in Fig. 14 was the rake angle. A. Yes, sir.

RXQ. 189. Looking at Fig. 14 and considering that the parts are reversed from the positions shown in Figs. 3 and 4, for example, are you still of the opinion that the angle you identified as the rake angle is the rake angle of the tool, or is it the clearance angle of the tool? A. To my knowledge it is the rake angle.

RXQ. 190. Referring to Fig. II of the drawings of the Melling application involved in this reference, you will

notice that the cutting edge of the tool and the body of the tool is inclined upwardly at an angle from the horizontal. In using the Gordon & Redlin machines did you incline their cutting tools 37 so that the cutting edges 40 thereof were inclined upwardly at the same angle as the angle of the Melling drawing, Fig. II? A. We did not. Our instructions were to grind the tool radial on the rake and straight face.

RXQ. 191. Were you given any instructions as to angle with respect to the horizontal that the cutting edge 40 should be set by the screw 39 for any one particular job or for different jobs? A. The adjusting screw 39 spoken of was used to bring the cutting surface 40 to the center of the tool rotating block. If you put the exact point 40 of the tool above center, you would have no clearance on the heel of your tool.

RXQ. 192. Does the Gordon & Redlin machine, assuming that the construction is perfect so that there is no play or distortion of parts, accurately and mathematically trace a predetermined outline by the point of the cutting edge 40 of the tool 37? A. Will you read the question. (Reporter reads question.) That is considering it without a cut?

RXQ. 193. Yes, you can consider it without a cut. A. My answer is yes.

(*RRDQ. 207 and Answer, page 229.*)

RE-RE-DIRECT EXAMINATION by Mr. Earl.

RRDQ. 207. Would it be possible to make a cam shaft that could be used by finish grinding this cam shaft Exhibit 36?

Mr. Dennett: Question objected to as the answer is perfectly obvious "Yes." A piece of metal is there and it can be shaped into anything that its shape will permit.

A. This shaft Exhibit No. 36 could not be finished and saved as a good piece of work on account of going under the manufacturer's specifications of size, this being caused by the irregular surface of the cam which would not allow it to clean up at a specified size.

FRANK STEINKE:

(Q. 1, page 230, to and including RDQ. 66 and Answer, page 238.)

DIRECT EXAMINATION by Mr. Earl.

Q. 1. What is your age; residence and occupation? A. Thirty-six, age; residence 1407 Homewild; occupation, factory manager.

Q. 2. By whom are you employed as factory manager? A. Jackson Motor Shaft Company.

Q. 3. How long have you been connected with the Jackson Motor Shaft Company? A. Since 1911.

Q. 4. What has been the nature of your employment? A. Inspector and superintendent.

Q. 5. How long have you been engaged as superintendent? A. I don't know; three or four years, I guess; three years.

Q. 6. Prior to that time you were inspector? A. Yes, sir, chief inspector.

Q. 7. What is the nature of the business of the Jackson Motor Shaft Company? A. Making crank shafts and cam shafts.

Q. 8. Are you acquainted with both Mr. Melling and Mr. Gordon, parties to this interference? A. Somewhat; yes, sir.

Q. 9. Did you have anything to do with the operation of the Gordon cam shaft machines which are owned by the Jackson Motor Shaft Company? A. I did.

Q. 10. Do you recall when those machines were delivered to the company? A. About 1920, I think.

Q. 11. What have you to say as to the operation of such machines? A. I don't quite understand you, I don't believe.

Q. 12. Did you use those machines in the turning of cam shafts? A. Yes, sir.

Q. 13. What have you to say as to the degree of success with which they were used? A. Which machine?

Q. 14. The Gordon machine? A. We had no success with them.

Q. 15. Will you kindly explain briefly what was done in that connection in the matter of endeavor to make them a success. A. Goddard was there and worked on them; he

was there two or three times, I guess, trying to make them work. Our tool men worked at them and done all they could trying to make them go. I think Mr. Gordon, Jr., was the first man who was there trying to make them go.

Q. 16. Was a representative of the Gordon concern there the day you first tried the first machine? A. Yes, sir.

Q. 17. What happened at that time? Was the machine operated? A. Well, the machine when they started her up sounded like a gatling gun of some kind; rollers flew in all directions; pins broke off.

Q. 18. What was then done with that machine? A. The top of the master was cut off.

Q. 19. Kindly refer to the Gordon & Redlin drawings and designate by number the cam you refer to? A. 44.

Q. 20. Were the cams in the Gordon & Redlin machine as delivered to you the same shape as the cam 44? I call your attention particularly to Fig. 6 and the lift part of the cam. A. The machine was delivered to us with the master in them and the point was cut down later on, after the machine was set up and run for a day or two, I guess the first day.

Q. 21. Kindly indicate what you mean by "point" on the drawings or on the exhibits.

(Witness refers to the point of Exhibit 20B.)

Q. 22. Did the machines operate successfully after those points were cut off? A. No, they never operated successfully. They would run part of the time for a day or so and be passable, but did not stay there.

Q. 23. For how long a time did you attempt to operate these machines? A. Five or six months, I should say.

Q. 24. What was the reason for discontinuing the operation? A. We could not make them work—too much scrap.

Q. 25. Just explain what you mean by "scrap." A. The shafts were in such condition that they had to be thrown away; they could not be shipped to the customer.

Q. 26. I call your attention to Melling's Exhibit 36. Is that one of your shafts? A. Yes, sir.

Q. 27. Is that a satisfactory shaft? A. No, sir.

Q. 28. Kindly indicate wherein it is not satisfactory. A. There is a big hole in there (witness points); another

one there; here is one here and there is another one there; there is another one (witness points to the cams). The eccentric might clean up, it's doubtful.

Q. 29. Just what do you mean by "clean up"? A. Finish to the blue print.

Q. 30. How are these shafts finished after coming from the machines? A. They are first carbonized and hardened, straightened and ground.

Q. 31. In grinding the shafts, how are they inserted in the grinder? A. Between centers, driven from the dog.

Q. 32. Are they all ground uniformly? Are all the cams ground uniformly? A. Yes, sir. We line up on the first cam and get that to clean up and balance and they have got to be in relation to that first cam.

Q. 33. That is, they must be timed or distributed about the shaft in relation to that? A. Yes, to the first cam to start to grind them.

Q. 34. If they are not so related, what is the result?

Mr. Dennett: Question objected to as not relating to the issue of this interference.

A. They will not finish.

Q. 35. Did you have actual superintendence of the machines, of these Gordon machines, while they were being used? A. Yes, sir.

Q. 36. What caused these irregularities to which you have called attention, the holes? A. As near as I could figure it out, it was the tool did not either follow the master or the master was not built right. The tool did not stay on the right angle.

Q. 37. Do you mean that the position of the tool varied? A. From the center line, yes, sir.

Q. 38. What method had you used in the manufacture of these cam shafts prior to your purchase of the Gordon machines? A. Rough grinding in a Landis.

Q. 39. What method or machine did you use when you discontinued the Gordon machines? A. We went back to grinding; we did not at any time stop grinding. When we had Gordon's machines there we were grinding at the same time.

Q. 40. What have you to say as to the percentage of scrap resulting from the Gordon machines as compared with this grinding? A. There were days when we would

scrap all we turned and other days when the scrap wouldn't be so heavy. It's hard to strike an average of scrap the machines made; we never kept any record of that. I would say about 20% at least.

Q. 41. You have spoken about Mr. Goddard's efforts and your assistance or efforts in the attempt to secure satisfactory results with these Gordon machines. Could you be more specific as to the particular things that were done?

Mr. Dennett: Question objected to as for calling for incompetent, inadmissible, irrelevant and immaterial testimony in this interference proceeding and as being merely cumulative in character.

A. Goddard ground the small tool grinder around the holes and the master cams, bumps and ridges to overcome the places where it showed on the cam as being turned. He changed all the tool blocks; we machined them and fitted new tools to them. In fact, we worked day and night to get them going. We did everything possible; Goddard put a fly-wheel on the master cam and changed the springs and fitted some new tools.

Q. 42. What has been your experience with the Melling machines that you have in your factory? A. They have been very successful.

Q. 43. I neglected to ask you what became of these Gordon machines that you discontinued the use of. A. Threw them out in the shed.

Cross Examination by Mr. Dennett.

XQ. 44. You referred to the Jackson Motor Shaft Company finishing these cam shafts to which you refer to a blue print. Was a blue print the standard by which you judged of the accuracy of the finished cams as to size? A. The size was on the drawing, yes, sir.

XQ. 45. Then what you meant by "finishing to blue print" was finishing to size indicated on the drawing or blue print? A. Yes, sir.

XQ. 46. How much of a margin of error as to size was permitted by your inspection department before rejecting a cam shaft as scrap? A. Our inspection department was given that limit from Lycoming, plus or minus five thousandths.

XQ. 47. Plus or minus five thousandths would give you a total leeway of 1/1000 of an inch extreme limitation permitted you? A. Yes, sir.

XQ. 48. Did the Jackson Motor Shaft Company keep any record or records from which it could be established that the percentage of scrap cam shafts turned on the Gordon & Redlin machines was 20% in excess of similar cam shafts worked out on what you called the rough grinding machines? A. No, sir.

XQ. 49. Are you an officer of the Jackson Motor Shaft Company? A. I am superintendent, if that is what you call an officer.

XQ. 50. Is the Jackson Motor Shaft Company a corporation? A. I don't know.

XQ. 51. You referred to certain so-called holes in this Melling's Exhibit 36 and gave as your reason for their presence on the exhibit that the tool did not stay on the right angle. Now, just what did you mean by stating that the tool did not stay on the right angle, or words to that effect? A. Well, I have seen this Gordon machine with a finished cam in the machine with the tool up on the back side of the cam and the machine revolves and places where she would not stay with the cam shaft.

XQ. 52. You mean one of those Gordon & Redlin machines that the Jackson Motor Shaft Company has? A. Yes, sir.

XQ. 53. Who made that demonstration or test? A. Mr. Weisel.

XQ. 54. When did he make it? A. Last week one day.

XQ. 55. Are there any of the exhibits offered here on behalf of Melling that will show in any manner the test or demonstration that you referred to? A. This is not what I saw (indicating), I seen the machine.

XQ. 56. You have just referred to Melling's Exhibits 18B and 18D which I showed you and said that you did not see these, but had seen it on the machine. Do you mean that you saw a cam such as shown by these Melling's Exhibits 18B and 18D with a tool in contact with the periphery of the cam as shown by these two exhibits? A. I did not see it on the exhibits, I seen it on the machine.

Mr. Dennett: Will the notary please read the question?

(Reporter reads question.)

A. I see a cam, but I don't know whether it was the same cam or not.

XQ. 57. But in saying that the tool did not stay on the right angle, explain from these Melling's Exhibits 18B and 18D what you mean by what you term "the right angle." A. The tool did not stay in the same position as the cam is revolved and did not follow the cam which we had ground which was the right shaped cam.

XQ. 58. You had ground a certain cam which you put in the machine in the position in which a cam would be cut by the machine, is that correct? A. Yes.

XQ. 59. Did you in making this test or demonstration alter or change the Gordon & Redlin machine on which the test or demonstration was made in any respect? A. No, sir.

XQ. 60. And the point of the tool of the Gordon & Redlin machine followed around the periphery of the cam which you placed in the machine with a precise tracing action to trace the figure of the cam, did it not? The point? A. It did not follow the cam.

XQ. 61. It did not follow the cam? When you noticed that the point of the tool did not follow the cam, did you then change the cam which is marked 43 on the Gordon & Redlin drawings so that the point of the tool would follow the cam in the work holder? A. We did not.

XQ. 62. You did not? A. No, sir; Goddard might have done that when he was trying to make them run.

XQ. 63. Were you referring to the fact that the point of the tool did not stay on the periphery of the cam when you said the tool did not stay on the right angle? A. It did not stay on the periphery of the cam nor stay on the right angle.

XQ. 64. What is, or would have been, the right angle for the tool to have stayed upon to have stayed on the right angle which you have referred to? A. I don't know.

Mr. Dennett: End of cross examination.

RE-DIRECT EXAMINATION by Mr. Earl.

RDQ. 65. Do you know why the point of the tool did not contact with the periphery of this cam as the cam was revolved? Do you know why it did not? A. Do I know why it did not?

RDQ. 66. Yes, the point of the tool. A. No, sir. If I did we would have had those machines working.

WILLIAM CUNNINGHAM:

(Q. 1, page 288, to and including Q. 16 and Answer, page 293.)

DIRECT EXAMINATION by Mr. Earl.

Q. 1. State your age, residence, and occupation? A. My age is 34; address 711 Loomis Street, Jackson; occupation is machinist at the Walcott Lathe Company, now.

Q. 2. Were you ever employed by the Jackson Motor Shaft Company? A. Yes, sir.

Q. 3. During what period was that? A. From 1918 to February, 1922.

Q. 4. What was the nature of your employment while with the Jackson Motor Shaft Co.? A. When I first went in there, I was Assistant Foreman of the Cam Department, and after I was in there about three months, I was appointed the foreman of the Cam Department.

Q. 5. While you were connected with the Jackson Motor Shaft Co., as foreman of the cam department, I take it you mean the cam shaft department? A. Yes, sir; the whole cam shaft department.

Q. 6. Certain machines, which have been referred to in this case as Gordon cam shaft machines, are said to have been purchased by the Jackson Motor Shaft Company. Did you have anything to do with such machines? A. Yes; I was in charge of those machines.

Q. 7. Did you have charge of the manufacturing or finishing the cam shafts by means of the rough grinders? A. Yes, sir.

Q. 8. Kindly state your experience in using Gordon machines while with the Jackson Motor Shaft Company?

By Mr. Dennett: Question objected to for the reason that it is improper rebuttal, the only testimony given on behalf of Gordon and Redlin in the taking of their testimony with reference to the machines sold the Jackson Motor Shaft Company being as to the facts of the sale of those machines to the Jackson Motor Shaft Company.

By Mr. Earl: It seems to counsel for Melling, that counsel for Gordon and Redlin has forgotten the testimony of Mr. Gordon relative to the machines of the Jackson Motor Shaft Company, and I would call his attention particularly to the statements of Mr. Gordon in answer to question 70 and certain succeeding questions.

A. While I was in charge of the cam department, this Gordon machine came in. We had a lot of trouble with that, producing scrap right off the start. They first claimed that it was in the forgings, and we had the dies trimmed down and other forgings made, with a very small amount of stock. That didn't help it. When they were coming up on the side of the cam, on the nose, they would cut right into the side, and they wouldn't follow up, and our scrap ran as high as twenty to twenty-five per cent. Another excuse was the center bearings. They mentioned the fact that we held our center bearings within a .005 limit, and some were got out with .002 or .003, but that didn't help it any. I dare say today, if they were using the Gordon machines, the scrap would run 30 per cent, because on the shafts we were turning out at that time, we used to buff the side of the nose on the side where they would cut in, where they wouldn't maintain the cutting angle but would cut in; some of it that wasn't so bad, we were able to buff them and let them go through, but the way they require cams nowadays, there would have been a larger scrap report yet, if we used them that way.

Q. 9. Mr. Gordon made the statement that Mr. Schultz and others of his organization admitted that the wear on the Gordon machines was largely due to their being located in close proximity to the rough cam grinding machines, where the grit from the emery wheels deposited thickly over the entire machine. What have you to say as to that? A. Both of these Gordon cam lathes, they were both situated farther away from the rough cam grinders than the Melling cam lathe was. One was thirty-five or forty feet away, and I don't know as there could be much emery dust that far. Another thing, the emery must have got in as soon as they come into the shop, because they never worked right from the first day they come in. One of our first troubles was breaking the stud that holds the roller. Mr. God-

dard working with their tool trouble man at that time, made new studs and tried every way by carbonizing them, and heat treating the studs and rollers, trying to make them hold up, but it seemed to be impossible to get them to do it.

Q. 10. Do you recall, on parts being replaced by Mr. Goddard, that Mr. Gordon claimed the wear was due to emery?

By Mr. Dennett: Question objected to as not proper rebuttal.

A. Why, Mr. Goddard worked on them a long time. He spent a long time, as much as three weeks there trying to put them in shape, get them in working shape. The shaft, as it came off and tested out in the finishing room, that came off the Gordon machine, in a test would run as high as, take as high as twenty thousandths to twenty-five thousandths to clean it up, and a rough cam shaft, they ought to clean anyway at six to eight thousandths, whereas with nearly twenty-five thousandths left on there to grind after they came from the heat treat, it could be easily seen that there would be scrap that came off the Gordon machine, and why they couldn't use them.

Q. 11. Did the renewal of any parts show improved product? A. No.

Q. 12. Mr. Gordon made the statement that Mr. Schultz did not make allowance for the kind of forgings which were furnished or which it was intended to turn. What have you got to say as to the character of the forgings?

By Mr. Dennett: Question is objected to as improper rebuttal, and further objected to for the reason that Mr. Schultz is referred to, and not this witness.

A. Why, the forgings wasn't any different on that machine than were put on any other. We even snagged them off on the rough grinder, when they claimed that was the trouble, put them on the rough grinder and snagged them off for the cam lathe. That didn't help it any. Then the dies were cut down, and a smooth forging was made with a very small amount of stock on, but that didn't improve the job any at all. And another thing with regards to that forging, I saw the same trouble last spring down at the Hudson Motor Car, where two Gordon machines, where they made a test on some Hudson shafts, and it

showed just the same thing that we had up here. They sent back 20 they made a test on, and they saved nine out of the twenty at Hudson's. I seen those shafts myself. They cut in on the side of the nose, come up on the nose, just the same as we did on the job up here.

Q. 13. Have you seen one of the Melling machines working on the Hudson job?

By Mr. Dennett: Question objected to as improper rebuttal.

A. Yes, sir.

Q. 14. Was there any difficulty there?

By Mr. Dennett: Question objected to as improper rebuttal.

A. No, sir.

Q. 15. Mr. Gordon asserted that it had been your practice to "Snag" the forgings before putting them in the rough grinder. What have you to say to that assertion? A. No; that wouldn't be necessary. We never snagged them for no rough cam grinding. We never snagged them for the Melling cam lathe, either.

Q. 16. Mr. Gordon also asserted that you are apparently unable to maintain uniform diameters on your work at the points required to be used as steady rest bearings. What was your experience in that regard? A. Well, we had a limit of .005 on there, and we took up the shafts for the Gordon machine. Now a five thousandths limit is loose, and we put on a three thousandths, and tried them, but that didn't help any. That was one thing he claimed, but that didn't make no difference whatever. Another thing, that wouldn't make any difference on the machine, because it would just hold it in or out a little on the steady rest; it would just make the cams smaller or larger, but it hadn't ought to change the size of the same at all.

(XQ. 19, page 293, to and including XQ. 43 and Answer, page 298.)

Cross Examination by Mr. Dennett.

XQ. 19. How many of the Gordon and Redlin machines did the Jackson Motor Shaft Company have while you were foreman of their cam department? A. Two.

XQ. 20. Did either of those two machines ever cut cams on cam shafts while you were the foreman of the cam department of the Jackson Motor Shaft Company? A. They never run steady, not one day that I can remember. They were always down for something.

XQ. 21. Did both of them run at any one time long enough to cut the cams on a single cam shaft? A. Why, there was some shafts we were able to put through. Nearly every shaft that I saw that came off of there, there wasn't a shaft that was perfect. The only way we could get them by was by buffing them. We would buff them and get them by in that way; otherwise, they never went out.

XQ. 22. What do you mean by buffing them? A. Where they cut in on the top of the nose. They would cut in there, and you couldn't get them to clean up after they were finished ground, after they went through the heat treatment.

XQ. 23. What do you mean by finish ground? A. After a cam shaft is turned on this machine, they go to the heat treatment, receive the heat treatment and harden, and then brought back and straightened and finish grind put on them.

XQ. 24. So, so far as the use of these Gordon and Redlin machines was concerned, of the Jackson Motor Shaft Company, while you were foreman of the cam department, they were not intended to be used by you for actually completing to a final finish cams to be used in internal combustion engines or for other purposes? A. Yes, they were. The shafts had to be corrected when they came off from them, and that is why we couldn't use them.

XQ. 25. You misunderstood my question, apparently. You referred to the cams being cut in the Gordon and Redlin machines and then the cam shafts being subjected to a heat treatment or hardening and to a finishing grinding operation after the heat treatment for hardening. The point of my question was simply this; were the cams, which were cut on cam shafts by the Gordon and Redlin machines at the Jackson Motor Shaft Company intended to be used just as they came from these Gordon and Redlin machines without any other operations upon the cams, and by any other operations on the cams, I mean any operations of any kind or character, whether heat treatment, finishing grinding so-called, or otherwise? A. No; they all have to receive heat treatment.

XQ. 26. And after the heat treatment, were they all finished ground, to give them the smooth surfaces around the cams? A. They only allow, for instance, the Maxwell Motor Company—

XQ. 27. (Interrupting) I am only speaking about the Jackson Motor Shaft Company? A. The stock is supposed to be evenly distributed on there. They don't take a shaft that is polished; it is just a little finish grind, and there is a very small amount of stock to come off of there; the case is very thin on there. Were you to grind on there, you would grind through the hard case. That job would leave this heavy stock on some parts of the cam, and then it would grind through the case.

XQ. 28. And by "case," you mean the case hardened surfaces which result from the heat treatment of the cam shafts? A. Yes; by "case" I mean case hardening surface.

XQ. 29. When you referred to the scrap in the Gordon and Redlin machines at the Jackson Motor Shaft Company, you referred to cam shafts that were not acceptable for use in internal combustion engines, or the purpose for which they were intended, as distinguished from any different kind of scrap, did you not? A. Yes. You mean they could not be used?

XQ. 30. Yes. A. Yes; they couldn't be used.

XQ. 31. I show you Melling's Exhibit No. 44, which has been testified to as a scrap cam shaft, and call your attention to the nose on one of the cams, at one end of the shaft, where the end of the nose nearest the end of the shaft has been chipped off. In your opinion, is that Melling's Exhibit No. 44 a piece of scrap, in the same general sense of the definition in which you use the word "scrap" in the cam shafts turned on the Gordon and Redlin machines? A. I am not in the cam shaft business now, and I don't know whether I should answer that question or not.

XQ. 32. You must answer the question as to whether that Melling's Exhibit No. 44 is a scrap cam shaft in the sense that you used the word "scrap" in connection with the cam shafts turned by the Gordon and Redlin machines? A. Yes; this would be a scrap shaft on account of the chip there on the nose, because they don't want them chipped on the nose. They have got to be smooth there, clear across the tops.

XQ. 33. You stated that the percentage of cam shafts turned on the Gordon and Redlin machines at the Jackson Motor Shaft Company's plant was what? A. The percentage of scrap?

XQ. 34. Yes? A. I think it was between twenty and twenty-five for the Gordon cam lathes.

XQ. 35. Do you have any exact figures on that point with you now, by which you could refer to it? A. No. The salvage department kept track of the exact figures on that.

XQ. 36. Then taking the larger percentage, that twenty-five percent, would leave seventy-five percent of the cam shafts turned on the Gordon and Redlin machines at the Jackson Motor Shaft Company's plant as cam shafts that you would not term "scrap." A. Seventy-five percent would not be scrap?

XQ. 37. Yes. A. No. The seventy-five percent would not be termed "scrap," but they cost too much to manufacture, because you had to buff the nose of them. A man had to stand there and buff everyone of those cams on the nose, so it cost too much to operate that way. In addition to the scrap, the seventy-five percent had to be buffed on the nose.

XQ. 38. While you were foreman of the cam department of the Jackson Motor Shaft Company, just what were the processes employed in the cam department in making and completely finishing those cam shafts? A. You mean the different operations?

XQ. 39. Yes, and different tools you used, whatever they were? A. The forging came in out of the yard, was snagged off on both ends, and then centered on both ends, and then it was straightened, received a straightening operation next. After the straightening operation, the center bearing was turned to size. After the center bearing is turned, the next operation is the spacing; all cams were spaced, or the rear end bearing turned. I mean by spacing, a forming tool cuts the side of the cams. After the spacing, the next operation is the turning between the cams, or the barrel of the shaft, and turning the front bearing. The next operation, go to the engine lathes, all bearings are chamfered on the corners. The shaft is cut off for length on both ends, and recessed for grinding operations. After that, the shaft goes to the key-way machine, the next opera-

tion is the shaft is straightened again; after the engine lathe work is done, the shaft is straightened on center to perfectly straight. The next operation is the milling of the key-way in here, to drive the shaft in the cam lathe. The next operation is on the cam lathe.

XQ. 39. Cutting the cams? A. Yes; cutting the cams or turning the cams.

XQ. 40. At the time you were foreman of the cam department of the Jackson Motor Shaft Company and before the Jackson Motor Shaft Company bought those two Gordon and Redlin machines, how were the cams on those cam shafts formed? That is, by what kind of tools or mechanisms, or hand work or anything; the point being in this question, simply to determine how these cams were shaped by the Jackson Motor Shaft Company prior to their acquiring these Gordon and Redlin machines? A. They were rough ground on the grinder; cam grinder.

XQ. 41. And while you were foreman of the cam department of the Jackson Motor Shaft Company, what percentage of scrap on these cam shafts did you have in the cam department from any sources whatever, other than the Gordon and Redlin machines? A. Well, the total output on the other machines would not run two percent, that is, outside of the Gordon machines, the scrap would not run two percent. That means total on low swung engine lathes, and everything.

XQ. 42. And that two percent of scrap would result from what causes, incorrect setting of the work in machines, or springing of the work, or faulty action of the machines? A. A man might make a mistake by setting his tool in, or something like that.

XQ. 43. That is, that two percent would practically represent entirely workmen's error and not machine error? A. Sometimes there would be machine error too; sometimes a man would happen to have a center break with him and he would scrap the shaft.

(RDQ. 44 and Answer, page 299.)

RE-DIRECT EXAMINATION by Mr. Earl.

RDQ. 44. You spoke of the first operation I think as "snagging the ends off the forging." Just what do you mean by that? A. On the forging, as it come in there, smooth them off, so the center could be put in there.

CHARLES GORDON:—

(Q. 56, page 402, to and including Q. 57 and Answer page 403.)

DIRECT EXAMINATION by Mr. Dennett.

Q. 56. Referring to Exhibit No. 18, how many of your machines were sold to the Jackson Motor Shaft Company, of Jackson, Michigan, up to the latest date of the papers in this exhibit, which is Order No. 13,740, dated February 12, 1920? A. Two machines.

Q. 57. Have you or your associates sold to Jackson Motor Shaft Company, of Jackson, Michigan, any of your machines since February 12, 1920? A. No.

(Q. 66, page 405, to and including Q. 74 and Answer, page 409.)

Q. 66. Referring now to your machines which you have sold, and excepting from your answer to this question the machines which you sold to the Jackson Motor Shaft Company, of Jackson, Michigan, have the machines proved satisfactory to the purposes and uses, as far as you know? A. As far as I know, they have.

Q. 67. While your personal appearance was not noted at the taking of Melling's depositions at Jackson, Michigan, you were, as a matter of fact, actually present in person during the taking of those depositions, were you not? A. I was.

Q. 68. You heard some of the witnesses produced on behalf of Melling criticise the machines sold to Jackson Motor Shaft Company, did you not? A. I did.

Q. 69. Before hearing their testimony, which ones of those witnesses had you previously personally known? A. I had met Mr. Schultz, Mr. Steinke and Mr. Weisel and Mr. Melling.

Q. 70. Mr. Schultz testified to the effect, in substance, that those two machines sold to the Jackson Motor Shaft Company were the rottenest machines he ever saw. What have you to say, if anything, in explanation of this testimony of Mr. Schultz? A. Mr. Schultz condemned the first machine we furnished him because certain elements in this machine wore out rapidly. It was admitted by Mr. Schultz and others in his organization, that the wear on the

machine was very largely due to the machine being located in close proximity to the rough cam grinding machines, where the grit from the emery wheels deposited thickly over our entire machine. The wearing points Mr. Schultz complained about did not wear in a like manner on other machines which we have had in operation at other plants. Mr. Schultz did not make allowance for the kind of forgings which were given us to turn in that these forgings had an excessive amount of stock to be removed. In one instance I remember distinctly where there was at points on certain of the cams as much as one-quarter inch of stock to be removed. Mr. Schultz and Mr. Steinke both admitted to me at that time that it had been customary for them to snag these high points off the rough forgings before the shafts went to the rough cam grinder, but they had hoped that with our cam turning machine it would be unnecessary to snag off these high points so that they would, if possible, save this operation. It was arranged with Mr. Schultz and Mr. Steinke, however, that they would, in the future, snag off this high point on the cams until they could have the forging dies resunk so that the forgings would not have this excessive stock which I have just referred to. A great many of the shafts given us to turn on our machine had very unequal amounts of stock to be removed from the cams; in some instances the cams would barely clean up on one side, while it was not uncommon to have from 3/16 inch to ¼ inch stock to be removed on another point. This variation was due to worn dies in some cases and to shafts not being properly straightened in other cases; also due to the fact that the cams on the rough forging did not always time up correctly. With reference to the quality of material and workmanship on the cam machines themselves, I know that neither material or workmanship was everything we would desire. I know that roller pins were improperly carbonized and hardened. This was also true of master cams. I also learned after the machines were delivered to the Jackson Motor Shaft Company that there were numerous deficiencies in workmanship and these errors in the mechanical parts of the machine in some instances reflected on the work turned out by the machines. When the machines were sold to the Jackson Motor Shaft Company, we were given to understand by the Jackson Motor Shaft Company's repre-

sentatives that the amount of stock to be removed would be reasonably uniform and not excessive, and by "not excessive," I mean that it was generally understood that there would not be more than ⅛ inch stock to be removed at any one point on the cams. This point was discussed between myself and Mr. Schultz prior to our receiving an order for these machines, and Mr. Schultz advised me that their forgings were usually very good and uniform, because, as he said, it made a lot of difference with them whether there was an excessive amount of stock or not for their rough grinding operations. Another point which caused us considerable trouble in securing satisfactory results from machines we furnished the Jackson Motor Shaft Company was the apparent inability of the Jackson Motor Shaft Company to maintain uniform diameters of their work at the points which we required to be used as steady-rest bearings. The diameters of these bearings varied as much as 10/1000 of an inch, and it seemed quite difficult for the operators of the machines turning or grinding these bearing points to hold them to a much closer dimension, the reason for this being, as explained to me by Mr. Steinke, that they had not found it necessary to maintain closer dimensions at these particular points when they were rough-grinding the cams instead of turning them.

Q. 71. Have you and your associates built your machines in factories owned or controlled by you? A. Prior to about eighteen months ago we had not built any of our machines in factories either owned or controlled by myself or any of my associates, but in the last eighteen months we have built a number of machines in a factory owned and controlled by some of my associates.

Q. 72. By whom and at what time were those machines built which were sold to the Jackson Motor Shaft Company? A. The machines sold to the Jackson Motor Shaft Company were built by the Eastern Production Company, Detroit, Michigan, and to get the date they were built it would be necessary for me to look up our records, but I might state they were built and immediately delivered to the Jackson Motor Shaft Company.

Q. 73. Did the Eastern Production Company ever build other machines for you than the two machines sold to the Jackson Motor Shaft Company, or did they have orders

from you to build other machines, and if so, state what was the result? A. The Eastern Production Company had a contract with me to build twenty-five cam-turning lathes. They turned over to me four or five of the machines, but they were not all accepted by me on account of both defective material and workmanship.

Q. 74. What has become of those two machines, if you know, which were sold to the Jackson Motor Shaft Company of Jackson, Michigan? A. I have not seen these machines for some time, but I was advised by Mr. Schultz of the Jackson Motor Shaft Company, about three weeks ago, that they were still in the possession of the Jackson Motor Shaft Company.

(XQ. 188, page 441, to and including XQ. 190 and Answer, page 442.)

Cross Examination by Mr. Earl.

XQ. 188. You have mentioned the variations in the forgings turned by the Jackson Motor Shaft Company, stating, as I recall it, that in some instances forgings would barely clean up and in others approximately one-quarter of an inch of stock to be removed. How do these variations compare with these Exhibits 5 and 6? A. The stock to be removed from the cams on Exhibits 5 and 6, while not of uniform amount about the finished cam, is much more uniform than was the case with the shafts I referred to at the Jackson Motor Shaft Company, the difference being that on the shafts at the Jackson Motor Shaft Company the excess material did not develop in a gradual increase or decrease but was more in the nature of abrupt lumps and depressions which made it very difficult for the machine to cut the shafts without abrupt and varying stresses on the shaft.

XQ. 189. Do varying stresses such as you speak of show up in the finished work? A. When we attempted to remove all of the excess metal in one cut, the abrupt variations in the depth of cut left their mark on the finished work. When the amount of stock was reasonably uniform and not excessive, the strain would not be, or would not show on the finished work to any appreciable extent.

XQ. 190. Did you have any knowledge of the Jackson Motor Shaft Company removing the humps or irregulari-

ties of any cam shaft prior to turning or attempting to turn them in the machines? A. I have no personal knowledge to that effect, but I was advised by the employees of the Jackson Motor Shaft Company that it had been customary for them to have an operation of snagging the lumps we complained of off the shafts before they attempted to rough grind them, which was their method of roughing the cams to the shape required prior to the hardening operation.

MASTER'S REPORT IN NATIONAL TUBE CO. v. MARK ET AL.

UNITED STATES CIRCUIT COURT OF APPEALS SIXTH CIRCUIT.

NATIONAL TUBE COMPANY,
Plaintiff-Appellant,
v.
CYRUS MARK, ANSON MARK and CLAYTON MARK, Co-partners and as MARK MANUFACTURING COMPANY,
Defendants-Appellees.
No. 4360.

(Master's Report as shown in the printed record on file in this court.)

"MASTER'S REPORT

(Filed February 29, 1924.)

PROCEEDINGS IN COURT.

This action was brought by the National Tube Company seeking an injunction to restrain The Mark Manufacturing Company from using a machine or apparatus for rifling iron or steel pipes or tubes which National Tube Company claimed infringed a patent known as the Fell Patent owned by plaintiff; and to recover damages for the alleged infringement.

On the hearing of the cause the District Court was of opinion that the rifling apparatus which The Mark Manufacturing Company was using in rifling pipe did not infringe the Fell Patent and refused to enjoin its further use.

The cause being carried to the Circuit Court, that court being of the opinion that the rifling machine, or apparatus, which the defendants were using for rifling pipes did infringe the Fell Patent owned by complainant, reversed the decree of the District Court, enjoined the further use by the defendants of their rifling machine, awarded damages to complainant (amount not determined) and sent its mandate to the District Court to be carried into effect; and ordered an accounting of the damages.

In obedience to the mandate of the Circuit Court the District Court entered its decree (a copy of which is hereto attached for convenience of the court) by which this cause was referred to me as master to report to the court.

a. To take an account of, to ascertain, take and state the number of apparatus for rifling pipes or tubes made, and the number used.

b. The extent of use of such apparatus in the rifling of pipes or tubes.

c. The quantity and size of pipes or tubes rifled with said apparatus.

d. The number of said apparatus sold by the defendants.

e. The number of said apparatus which the defendants have on hand.

f. The gains, profits, savings, and advantages derived by defendants from and through said infringement.

g. To assess the damages suffered by complainant by reason of said infringement.

The order of the court further required the defendants to produce and account, books, statements, vouchers, etc., and to submit to oral examination, etc., and restrained defendants' further use of the infringing apparatus or machine.

PROCEEDINGS BEFORE THE MASTER.

On receipt of the order of reference, I issued an order requiring the defendants to file an account in form of debit and credit showing the manufacture and use by them of infringing machines, as well as the gains, profits and savings by the use of such machines.

On March 11, 1915, the defendants in compliance with the order filed an account, and shortly after amendments and supplements. This account as amended and supplements appears in Volume I, pages 106 to 139, of the printed record herewith filed.

The usual practice in proceedings of this sort seems, from the authorities I have consulted, to be that upon the

filing by the defendant of his account the complainant files such exceptions to the account as he desires, and the hearing proceeds upon the issues presented by the account and the exceptions.

In this cause the complainant filed no formal exceptions to the account, but in the course of the hearing attacked various items and testimony was offered by both complainant and defendants attacking and supporting the account.

No objections being made to such evidence on the ground that no formal exceptions had been filed I allowed the testimony to be taken.

Counsel, on both sides, having proceeded all through the hearing as if formal exceptions had been filed, it is now, in my judgment, too late for either party to object to the evidence offered and taken attacking and supporting the account on the ground of failure to file formal exceptions to the account.

At the beginning of taking testimony, in Columbus, Ohio, the hearing had progressed but a few days when it became evident that a great mass of testimony consisting of books of original entry, contracts, vouchers, etc. would be required. These matters of evidence consisting largely of many books of account of great volume, kept at the offices of the parties and needed there at frequent intervals in the course of their business, it was agreed by counsel, the master consenting, that a recess be had and further testimony taken at the offices of the parties where the books and other items of evidence required might conveniently be accessible.

Under this arrangement many sessions have been held at New York City, Pittsburgh, Pa., Youngstown, Ohio, and Zanesville, Ohio, with frequent recesses to enable accountants to examine books and to make and examine tabulations, schedules and estimates, all which has tended to cause the seeming delay in concluding this investigation.

CONCEDED FACTS.

The complainant, National Tube Company, is a corporation organized under the laws of the State of New Jersey, engaged in the manufacture of steel and iron tubes and pipes.

The defendants are a partnership as The Mark Manufacturing Company operating a plant for the manufacture of pipes and tubes, large and small, and pump supplies at Evanston, Illinois, and a plant engaged mostly in the manufacture of large pipes and tubes, at Zanesville, Ohio.

The National Tube Company is a corporation organized under the laws of the State of Ohio, operating a plant at Lorain, Ohio, for the manufacture of tubes, pipes and other iron and steel products.

National Tube Company, The National Tube Company, National Works, Christy Park Works, Republic Department, Continental Works, Pennsylvania Works, as well as other plants, are conceded (see plaintiff's brief, p. 48), to be subsidiaries of, and owned by, The United States Steel Corporation, although organized and operated, in form, as separate legal entities.

Several of these subsidiary companies had manufacturing plants which were, or with comparatively slight additional equipment could have been able to have filled the order of rifled pipe out of which this controversy arose, had they received the order.

THE 1909 ORDER.

Early in the year 1909, The Southern Pacific Railroad Company was desirous of placing an order for a large amount—approximately one hundred and ninety miles—of eight inch rifled pipe, and in pursuance of that end, entered into correspondence with a number of pipe manufacturers, including plaintiff and defendant, seeking bids for the desired order of pipe.

Following, and doubtless as a result of this correspondence, in March, 1909, National Tube Company bid to manufacture the desired quantity—approximately one hundred and ninety miles of pipe—at 75¢ per lineal foot. (See testimony, Vol. I, pages 145 and 171).

About the same date the Mark Manufacturing Company bid to furnish the order of pipe at 67½¢ per lineal foot. One, or probably two, other manufacturers bid for the order at prices from 70¢ to 76¢ per lineal foot.

The Mark Manufacturing Company was the lowest bidder so far as the evidence shows, and a contract was entered into between that company and the Railroad Com-

pany by which the Mark Manufacturing Company agreed to make and furnish approximately one hundred and ninety miles of eight-inch rifled pipe according to specifications contained in the bids. The contract also provided that the Mark Company were granted, for use in making the pipe stipulated in the order, a license to use the Isaacs & Speed Patent for rifling machines which was then held by the Railroad Company.

The Mark Manufacturing Company constructed for use in rifling pipe to fill the 1909 order, a rifling machine based in part upon the principles evolved from the Isaacs & Speed Patent and in part on principles which the Mark Manufacturing Company claimed were the inventions of its own engineers. This rifling machine so designed and constructed by the Mark Company has been decided by the Circuit Court to have been an infringement upon the Fell Patent owned by National Tube Company.

ANSWERS TO QUESTIONS REFERRED.

I now take up and endeavor to answer as best I may from the testimony offered the questions referred to me by the decree of the court.

a. State the number of apparatus for rifling pipes or tubes made and used.

The Mark Manufacturing Company built one rifling machine, being the rifling machine found to infringe the Fell patent. This machine was used for the entire one hundred and eighty-four miles of eight-inch pipe made under the April, 1909, order for The Southern Pacific Railroad Company.

The testimony shows that this apparatus, or machine, has not been used except for that order of pipe, and that the Mark Company have constructed no other similar machine.

b. The extent of use of such apparatus in the rifling of pipes or tubes.

With the rifling apparatus, or machine, mentioned in the answer to paragraph "a" above, constructed by the defendants, they rifled in April, 1909, to January, 1910, inclusive, one hundred and eighty-four lineal miles of eight-inch pipe; all rifled for The Southern Pacific Railroad

Company under the contract between it and The Mark Manufacturing Company, referred to in the record as the "1909 Order."

c. The quantity and size of pipes or tubes rifled with said apparatus.

With the apparatus or machine mentioned in preceding answers, The Mark Manufacturing Company rifled one hundred and eighty-four miles, lineal measure, of eight-inch pipe. No other pipe was rifled with the machine.

d. The number of such apparatus sold by the defendants.

The defendants sold no machine or apparatus for rifling pipes.

e. The number of said apparatus which the defendants have on hand.

The evidence clearly shows that the defendants made but the one infringing machine or apparatus. This machine was operated in the years 1909 and the month of January, 1910, in rifling one order of pipe for The Southern Pacific Railroad Company, and has not since been operated. No testimony has been offered to show, and I am, therefore, unable to report, what became of the machine beyond the fact, undisputed, that in January, 1910, it was in the possession of the defendants.

f. The gains, profits, savings and advantages derived by defendants through said infringement.

To arrive at an answer to this paragraph it seems best to subdivide it and to consider the several elements separately. I then consider, first:

GAINS AND PROFITS.

Amended Sheet No. 16 (See Testimony, Vol. I, page 106) purports to show the cost of production of eight inch rifled pipe manufactured for the Associated Pipe Line Company, Southern Pacific Railroad Company, under the 1909 order to have been $679,067.34.

Sheet No. 15 (Testimony Vol. I, page 134), shows the total amount charged to the Associated Pipe Line under the 1909 order to have been $677,202.20.

Sheet No. 17 (Testimony Vol. K, page 137), shows the amount received by the Mark Company from Associated

Pipe Lines for eight inch rifled pipes under the 1909 order to have been the same as that charged, viz: $677,202.20.

These amounts seem to indicate a net loss to the Mark Company of $1,865.26 on the 1909 order.

The Mark Company in 1909 operated two plants, one at Evanston, Illinois, engaged in the manufacture of pipe—large and small—and a large number of small articles designated in the testimony as "Pump supplies," and one at Zanesville, Ohio, engaged in the manufacture of large pipe. The Mark Company in distributing its overhead charged the pump supply business, arbitrarily, 5% of the sales from the business, the remaining 95% of the overhead was charged to the pipe production of the two plants in the proportion to the pipe production of each. Extended cross examination failed to elicit any reason for this method of apportioning the overhead save that this method was the Mark Company's usual way of apportioning the overhead.

It is apparent from the testimony that the overhead expense of the pump supply business was proportionately fully as great as that of the pipe business, and in fairness should have been an equal proportion of the overhead.

The value of the total production of the Zanesville plant for 1909 (See Testimony Vol. 1, p. 44) was		$3,024,557.27
The value of the total production of the Evanston plant for 1909 (See Testimony Vol. I, pp. 47 and 48) was:		
Pipe	$2,299,735.23	
Pump Supplies	494,029.98	
Total		2,793,765.21
Total production of the two plants		$5,818,322.48
The overhead charged by the Mark Company was as follows (Vol. I, p. 50):		
Zanesville Pipe	$230,730.98	
Evanston Pipe	105,223.86	
Evanston well supply ..	24,701.50	
Total	$360,656.34	

No fact has been shown to justify charging the pump or well supply business with a smaller percentage of the overhead expense than the pipe business.

Had the overhead been apportioned to the pump supply business and to the pipe business, as seems to be fair, the gain to the 1909 order would approximately equal the apparent loss of the Mark Company.

I, therefore, find, and so report, that the Mark Manufacturing Company suffered no loss, and gained no profit on the March, 1909 order for rifled pipe.

SAVINGS.

The undisputed evidence shows that, in the manufacture of rifled pipe to fill the 1909 order, the Mark Manufacturing Company had the right under its contract to use the Isaacs & Speed rifling machine. This machine at that time had not been used in rifling hot pipe and had not proved satisfactory in rifling cold pipe. For this reason, or other reasons not disclosed by the evidence, the Mark Company designed and constructed the rifling machine which it used in rifling pipe to fill the March, 1909 order, being the same rifling machine which the Court of Appeals has found to infringe the Fell Patent owned by the plaintiff.

The Plaintiff insists that by the use of the infringing machine the Mark Company effected a great saving in manufacturing costs, in this part the Fell rifling machine, and the infringing machine could rifle pipe much more rapidly than the Isaacs & Speed machine, thereby effecting a great saving of time and labor in rifling pipe; that the Fell machine which defendants' machine infringed, could rifle the minimum output of the style of furnace then in general use, viz, twenty pieces of eight inch pipe per hour, while to rifle the same number of pipes per hour would require four Isaacs & Speed machines.

In support of this contention plaintiff called, as experts, two witnesses, Charles Fell and Charles H. Pinkney (see testimony Vol. I, pages 315 to 345).

The plaintiff claims, basing its claim on the testimony of these experts (see plaintiff's brief, page 12), that the Mark Company by using the infringing machine made a savings in producing rifled pipe for the March 1909 order of $98,250.00.

The claim of these expert witnesses is fairly stated by one of them, Mr. Fell, in his testimony at Vol. I, page 317, of the testimony.

"Question 15: In estimate No. 1, referring to hot rifling you have provided four Isaacs & Speed machines in comparison with one Fell machine. Is that right?

Answer: It is.

Question 16: Why did you make this difference in the number of machines for the two cases?

Answer: Because the Isaacs & Speed machine would be very much slower. We estimated that the mill making twenty pieces of eight-inch pipe per hour, it would take four of the Isaacs & Speed machines to keep with the mills to do the rifling. With the Fell machine, from actual experience, it has rifled over 600 pieces in ten hours, or 60 pieces an hour.

Question 17: The mill you refer to is the equipment for making and supplying the pipe to the rifling machine, and why did you assume 20 pieces of 8 inch pipe an hour, is that an ordinary mill production?

Answer: That is about the minimum production for one of the old fashioned mills."

Clearly, the saving estimated by these two expert witnesses was to be derived from the fact, as they evidently believed it to be, that one Fell rifling machine could rifle the pipe, hot as it came from the mill, as fast as it would come from the ordinary "old fashioned mill" in use at that time (1909) while four Isaacs & Speed machines would be required to do the same work.

If it be true, as the expert witnesses Fell and Pinkney testified, that one Fell rifling machine could rifle the pipe as rapidly as it was produced by the mill, and that four Isaacs & Speed were required to do the same work, it logically follows that, had the Mark Company used the Isaacs & Speed machine in producing the 1909 order of rifled pipe, they would have been obliged to use one rifling machine with consequent loss of time by reason of the inability of the machine to rifle the pipe as fast as it came from the mill, or to have installed four Isaacs & Speed machines. To have used only one machine would have resulted in great loss of time. To have used four machines would have necessitated the installation of four expensive machines.

On October 15, 1919, in the presence of counsel and the master, at the Mark Company's Zanesville plant, a demonstration was had of the actual work of the Isaacs & Speed rifling machine (see testimony Vol. II, pages 36 *et seq.*).

The Isaacs & Speed machines used at that time had been constructed after this action for infringement was brought, to be used in rifling pipe for the Southern Pacific (March, 1909) order in the event that the further use of the rifling machine (the infringing machine) which the Mark Company was then using should be enjoined (see testimony Vol. II, page 53).

This practical demonstration of the actual working of the Isaacs & Speed rifling machine was made in the Mark Company's plant, the same plant in which the infringing machine was used, was so far as I could observe, fairly conducted and was not challenged by counsel.

At this demonstration the Isaacs & Speed machine rifled pipe, hot, as fast as they came from the mill. I took the time of several pipes as they came through the rifling machine in from fifty-seven to sixty-five seconds each.

If Fell and Pinkney's estimate of a production by "old fashioned" mills used in 1909, of twenty pieces of pipe per hour, be correct, it follows, as the demonstration clearly showed, the rifling capacity of one Isaacs & Speed rifling machine was more than double the capacity of the pipe mill to produce.

Fell and Pinkney's estimate of saving by use of the infringing machine was based on the hypothesis that one Fell machine could rifle twenty pieces of pipe per hour and that one Isaacs & Speed machine could rifle but five per hour. The demonstration, the fairness of which has not been controverted, of the Isaacs & Speed machine having demonstrated that it would rifle the pipe much more rapidly than Fell and Pinkney's estimate of twenty pieces per hour, it follows, and I so find and report, that the Mark Manufacturing Company effected no saving by the use of the infringing rifling machine.

ADVANTAGES DERIVED BY DEFENDANTS FROM AND THROUGH SAID INFRINGEMENT.

I am unable to find that the defendants derived any advantage from and through the use of the infringing rifling machine. I, therefore, find and report that defendants derived no advantages from and through said infringement.

g. To Assess the Damages Suffered by Complainants by Reason of Said Infringement.

Plaintiff's counsel at pages 1 and 2 of his brief states plaintiff's claims to recover damages and profits under appropriate headings. I shall consider these claims in their order as stated by plaintiff's counsel.

(1) Defendants' actual profits.

This question is, I think, fully covered at pages 10, 11 and 12 above and need not be further considered here.

(2) Defendants' saving by the use of the infringing machine as compared with that of Isaacs & Speed, which was the only alternative.

This subject has, I think, been fully covered at pages 12 to 16, inclusive, above. I need only add here that the evidence shows that there were in existence in 1909 two patents for machines for rifling pipes or tubes, viz., the Fell patent owned by the plaintiff, and the Isaacs & Speed patent for the use of which defendants held a license.

I do not recall, nor do I find in the printed record, proof that there were no other rifling machines. If other machines were in existence, defendants doubtless had the alternative to use them if not covered by patents, or if patented, to have negotiated with the owners for licenses to use them.

(3) Plaintiff's damages by reason of loss of profits which it would have made but for the infringement.

This claim is based on the testimony of Mr. Bolton C. Moise, auditor of plaintiff company, supported in minor details by other witnesses. Mr. Moise based his testimony upon his knowledge and experience as cost accountant and upon plaintiff's cost records of a large order for eight-inch rifled pipe which his company received and filled in the

latter part of the year 1909, at which time Mr. Moise tells us manufacturing conditions, prices of materials and cost of labor did not materially differ from those prevailing in March, 1909.

In support of his testimony Mr. Moise submitted numerous extensive tabulations collated from The National Tube Company's cost records of the order taken and filled in the latter part of the year 1909.

Mr. Moise testifies that if his company had received the March, 1909, order, taken by defendants, the pipe covered by that order would not have been manufactured by National Tube Company, the plaintiff here, and a bidder for the March, 1909, order, but would have been manufactured by an affiliated company, The National Tube Company of Ohio.

This company, the National Tube Company, Mr. Moise tells us, could have filled the order in question beginning with the iron ore, charcoal and other raw material, and carrying them through the successive stages of pig iron, ingots, slabs, plates, skelp, plain pipes or tubes, rifled pipes, and lastly, finishing the rifled pipes by evening up and threading the ends so that the several pieces could be connected to form, in effect, one continuous pipe line for conveying oil between different points.

Plaintiff claims the damages by loss of profits on the 1909 order, calculating from ore to finished product, would have been $353,245.00 (see plaintiff's brief, page 33). Objection was made to this testimony and counsel not being ready to present arguments and authorities, the testimony was taken subject to exception.

As appears above, in the manufacture of finished rifled pipe from the ore to the finished product, there are eight distinct separate processes: (1) manufacture of pig iron; (2) manufacture of steel ingots; (3) manufacture of slabs; (4) manufacture of plates; (5) manufacture of skelp; (6) manufacture of plain tubes or pipes, unfinished, and ready to go to the rifling machine or to be finished for use as plain pipe as may be desired; (7) rifling the unfinished plain pipe; (8) finishing the rifled, or plain, pipe by evening and cutting threads at the ends of the pipes so that they may be coupled together to form continuous lines of pipe.

The first four of the processes enumerated each produces a complete finished commodity, bought and sold in

the markets and listed for each. In each case the process of manufacture is the same whether the finished product is intended ultimately to be used in the manufacture of pipe or for the manufacture of any other of the innumerable products of iron or steel. The fifth and sixth processes are the same whether the final product is to be rifled, or plain, pipe; and the eighth or final process is practically the same for rifled and plain pipe.

In only one, the seventh, of the enumerated stages is the rifling machine used. It follows that only in that single process was the infringing machine used. The pig iron, ingots, slabs, plates, skelp, and even the plain pipe which would have been required to fill the 1909 order might all have been manufactured by plaintiff and sold by it in the market, presumably at a profit on each regardless of whether the plaintiff did or did not receive that order.

It follows to my mind, that this testimony showing in a lump sum the estimated profit of $353,245.00, for the entire manufacture from ore, through the successive stages, in only one of which the infringing machine was, or could be, used, to the finished product, is incompetent and cannot be considered for the purpose of showing the profits which plaintiff would have gained but for the infringement. It must be borne in mind that at no stage of the manufacture, save the seventh, was the infringing machine used, and the evidence furnishes no means of determining what portion of the estimated profit of $353,245.00 is derived from the rifling process.

Hence, I am forced to the conclusion that plaintiff has failed to prove any loss of profits by reason of the infringement.

Plaintiff also claims a profit (see Plaintiff's Brief, page 33) which it claims it would have gained on eight and one-half miles of plain pipe sold by the Mark Company to the Southern Pacific Railroad Company. The plaintiff did not bid for this order, neither does it appear that the order for rifling pipe was in any way dependent on the order for plain pipe. No rifling machine was used in the production of the plain pipe. I see no support for, and therefore cannot allow, this claim.

The defendant claims that there should be no award in favor of the plaintiff and supports his claim by an in-

genious, but, I think, fallacious line of argument, because he says, (1) it is not shown that plaintiff would have received the 1909 order even had the Mark Company not received or even bid for the order. It is true that had defendant not secured this order, plaintiff might also have failed to secure it. The Southern Pacific Company, if it had not received the lower bid of the Mark Company, might have accepted some other bid or might have abandoned its purpose of using rifled pipe; as to this we can only guess. The fact remains, the Mark Company did receive the 1909 order and in the manufacture of pipe to fill the order did use the infringing rifling machine. The decree of the Appell*ant* Court has established the infringement and awarded damages for the infringement. This seems to me to leave nothing for the master here but to ascertain and report the amount of the damage which he thinks under the facts should be awarded.

Defendant claims no damages should be awarded plaintiff because (2) even had plaintiff received the 1909 order The National Tube Company of Ohio would have made the pipe to fill the order and The National Tube Company would not have received the profit.

Mr. Moise did give testimony tending to show that had The National Tube Company, a subsidiary of The United States Steel Company, received that order, another subsidiary company, The National Tube Company of Ohio, would probably have made the pipe required to fill the order and that National Tube Company would not have received, directly, any part of the profit of the work.

The fallacy of defendant's argument lies in the fact, as it appears to me, that it is no concern of the defendant, that plaintiff, had it received the 1909 order, might have elected to have the actual work of making the pipe done by its fellow subsidiary, The National Tube Company. Neither does it concern defendants that National Tube Company, instead of distributing the profits of the work in form of dividends of National Tube Company might have turned the profit into the treasury of The United States Steel Company, to be ultimately distributed in form of dividends on United States Steel Company stocks.

The Mark Company has infringed plaintiff's patent and must pay the damage for its infringement no matter

what disposition the owner of the patent, National Tube Company, may or might have elected to make of the sum received as profits had it received and filled the order.

LICENSE.

The plaintiff called as a witness Mr. Fraser, an attorney experienced in patent litigation and the determination of royalties and license fees to be paid for rights to use or vend patented articles as well as in determining damages to be paid for infringements of patents, as well as being familiar with the reported decisions of the courts in such matters.

A hypothetical question put to this witness (see Testimony, Vol. I, pages 351 *et seq.*) assumes the main facts as to the manufacture of rifled pipe for which plaintiff contends. Among other things the question assumes in substance that the Isaacs & Speed machine had not, in 1909, been used in rifling hot pipe, and that in rifling cold pipe it spoiled a portion of the pipe and operated very slowly; that the Fell machine obviated this difficulty; that plaintiff's bid for making the order of pipe was seventy-five cents per foot; that defendants underbid plaintiff and secured the order; that defendants for the order in question had a right to use the Isaacs & Speed machine, but instead built and used a machine which had been adjudicated to infringe plaintiff's patent; that plaintiff, had it received the order, could have made the pipe, from ore to finished pipe at a profit of $364,763.00; or from skelp to finished pipe of $230,725.00 or $249,222.00; that defendants, had they used the Isaacs & Speed machine, would have increased its cost of production in the sum of $137,513.00.

Upon these assumed facts the witness was asked to give his opinion as to what would have been a fair and reasonable license fee to have been paid plaintiff by defendant for the privilege of using such machine in the manufacture of pipe to fill the order in question.

To this question defendants objected. There being testimony tending to support the assumptions of the hypothetical question, I overruled the objection, to which ruling the defendants excepted.

Answering the question the witness gave as his opinion that upon the facts stated in the hypothetical question

$110,000.00 would have been a fair license fee to have been paid by the defendants to plaintiff as a reasonable license fee for use of the Fell patented machine in producing rifled pipe for the 1909 order, and that if a reasonable license fee is to be considered as a basis for determination of the damages to be awarded for the infringement, the damages would be $110,000.00. (See Testimony, Vol. I, pages 361 to 368.)

The witness also stated in cross examination that if estimated profits and savings assumed in the question were reduced below the amounts stated in the question, his estimate of a reasonable license and damages for infringement would be correspondingly reduced.

If I am right in the opinion that plaintiff's estimate of the profit it might have made had it received the 1909 order, in so far as it consists of profits on processes of manufacture of completed marketable articles in the manufacture of which the infringing machine had no part (see page 18 *sup.*); and that as a matter of fact defendants made no substantial actual saving by using the infringing machine (see page 12 *sup.*); then this witness's estimate of a reasonable license fee and of damages would be greatly reduced.

The defendants called as witnesses on the question of a reasonable license fee, two witnesses, Mr. Edwards and Mr. Reynders, both men of experience in adjustment of license fees for use of patented machines of various sorts. (See Testimony, Vol. II, pages 101 *et seq.*)

Mr. Edwards was asked whether he considered Mr. Fraser's estimate of $110,000.00 damages, assuming that use of the infringing machine effected a saving of $137,513.00, reasonable, and answered that he did not consider that a reasonable royalty.

Mr. Reynders (see Testimony, Vol. II, pages 108-117) believed that, assuming savings resulting from use of infringing machine instead of the Isaacs & Speed machine which defendants had a license to use, amounted to $137,513.00, a reasonable royalty would be 25% of the saving, or $34,378.25.

SPECIAL DAMAGES.

Plaintiff asks (see Plaintiff's brief, page 39) that any amount awarded as damages be tripled.

If the evidence clearly showed that the defendants were guilty of a deliberate and intentional appropriation of the form or underlying principles of plaintiff's patented rifling device, no court would, or should, hesitate to inflict the extreme penalty.

In this case the evidence fails to show an intention on the part of the defendants to infringe plaintiff's patent. Having in mind that, after a full and exhaustive hearing, one court believed defendant's rifling machine did not and another court believed that it did infringe, it seems easy to believe that defendants in designing and constructing their rifling machine may very likely have believed in good faith, that they were not infringing plaintiff's patented rifling device.

The fact remains, however, as established by the decree of the Court of Appeals, that the defendants, whether intentionally or through mistaken judgment the evidence does not show, did infringe the Fell patent. In that situation the plaintiff, if it believed the Fell patent to be of real value and desired to preserve to itself the benefit of that value, was obliged to protect that patent against this infringement and others that might be expected to follow if no action were brought on this, by bringing this suit, and to incur annoyance and expense of this litigation.

The infringement by the defendants having made this suit necessary, it seems to me fair and right that the plaintiff's costs and expenses in preparation and prosecution of this suit should be taken into account in fixing the amount to be awarded the plaintiff as damages. The amount of such cost and expense is, of course, not shown in the evidence. From the volume of the record and the time consumed I think it safe to say that an award of $15,000.00 to cover costs and expense of this litigation would not be too great.

I, therefore, report and recommend that to the amount hereinafter to be reported as damages for infringement there be added the sum of $15,000.00.

DAMAGES.

The decree of the court having established the fact of infringement and plaintiff's right to recover damages for that infringement, it remains for me to find from the evidence adduced, and to report to the court, the amount which in my judgment should be awarded.

As appears above we cannot determine from the evidence whether or not plaintiff would have received the 1909 order for pipe had defendants not gotten it.

The estimate offered by plaintiff of the profit plaintiff believes it could have gained had it received that order being based on many separate and distinct manufacturing processes from ore to finished rifled pipe, each resulting in a finished marketable commodity, and in but one of which was, or could, the infringing machine be used, and no means furnished by which to determine how much of that estimated profit would have accrued from the rifling process, it seems impossible to determine from the evidence offered, what profit plaintiff would have gained in rifling pipe for the 1909 order if it had received and filled that order.

As also appears (see page 12 *sup.*) the alleged saving to defendants by the use of the infringing machine is not established by the evidence. The plaintiff claims, basing its claim on the opinion of the experts, contradicted by physical demonstration of actual working of the Isaacs & Speed machine, that this saving amounted to $137,513.00.

The defendants on the other hand claim they made no profit on the 1909 order; and further, basing their claim on what they claim they now know, but did not know in 1909, of the working of the Isaacs & Speed machine working on hot pipe, that it could and would rifle pipe equally as well and rapidly as the Fell or the infringing machine, and that therefore they made no saving by the use of the infringing machine.

Being unable to determine from profits, not shown to have been realized by defendants, on the 1909 order; the plaintiff's claim of profits it estimates but fails to prove it could have made on that order had it gotten the order; and the failure of the evidence to establish actual saving to defendants by use of the infringing machine, the only means remaining for determining the damages which

ought to be awarded for the infringement occur to me to be a consideration of the facts as they are shown to have been in 1909, and from these facts to determine what award is fair.

With this thought in mind I recall the facts as the evidence shows them to have been at the time of the infringement (1909).

The Mark Company had bid for and received the order in question for one hundred and eighty-four miles of eight-inch rifled pipe at a contract price aggregating for the entire order $677,202.20.

The contract for the manufacture of this pipe carried with it a license to use the Isaacs & Speed patented rifling machine for rifling the pipe required to fill the order.

The plaintiff had bid for the 1909 order of pipe, but not being the low bidder had not received the order.

The minimum capacity of the Mark Company's pipe mill then in use was twenty pieces of eight-inch pipe per hour.

For economical production the pipe must be rifled as rapidly as they came from the mill—otherwise the mill could not be operated to full capacity with resultant partial idleness of the mill for a portion of the time, and consequent loss of time and labor.

The Isaacs and Speed machine, at that time, had not been used in rifling hot pipe, and in rifling cold pipe had not been a success, being slow in operation and spoiling a considerable percentage of the pipe rifled.

National Tube Company held a patent for a rifling machine (the Fell patent), which could rifle the pipe hot as rapidly as the Mark Company's mill could produce it.

It is safe to assume that in bidding on an order of the magnitude of the 1909 order the Mark Company made careful estimates of the cost of production of the pipe required to fill the order and expected to reap a fair profit in filling the order at the price bid.

The Mark Company in that situation had before it three alternatives:

First: It might negotiate with the plaintiff, National Tube Company, for a license to use the Fell patent, which had proved in actual production capable of rifling pipe, hot, as rapidly as the Mark Company's mill could produce it.

Second: It might use an Isaacs & Speed rifling machine which at that time had only been used in rifling cold pipe, or,

Third: It might, as it did, try to design and construct a rifling machine capable of meeting its requirements and not infringing the Fell patent.

In considering the second alternative the Mark Company were confronted with the fact that the Isaacs & Speed machine had not then been used in rifling hot pipe, and that on cold pipe it could rifle but five pieces per hour, while the minimum capacity of the company's mill was twenty pieces per hour. It must also have been considered that if the Isaacs & Speed on actual trial should fail to rifle hot pipe more rapidly than cold pipe, four machines, at a cost of approximately $25,000.00 would be required to rifle to the capacity of the mill, as well as the fact that for the most economical production the pipe must be rifled as rapidly as the mill could produce. It must also have been considered that the Isaacs & Speed machine in rifling cold pipe spoiled a percentage of the pipe and might do the same with hot pipe.

The Mark Company, doubtless, after consideration of all these and perhaps other facts, chose the third alternative, i.e., designed, constructed and used a rifling machine which the court has decreed infringes the Fell patent.

Had the Mark Company known the rifling machine it designed and constructed was an infringement upon the Fell patent, we may safely assume that as a law-abiding citizen it would have refrained from using that machine. Its only alternative would have been to use the Isaacs & Speed machine whose operation on cold pipe was impracticable, and on hot pipe an untested problem, or to purchase a license to use the Fell machine. What, under those circumstances, would have been a fair and reasonable license fee to have been paid by the defendant to the plaintiff for a license to use plaintiff's patented machine in making pipe for the 1909 order, bearing in mind the fact that the Mark Company had the 1909 order with the anticipation of a profit and the further fact that National Tube did not have the order and could expect no profit from that order unless through a possible sale to the Mark Com-

pany of a license to use the Fell patent in producing pipe to fill the order.

Had the Mark Company then had the knowledge of the efficiency of the Isaacs & Speed machine working on hot pipe which it now has, it would naturally have refused to pay anything for such a license.

But taking the facts as known in 1909, the time of the infringement, with the uncertainty as to whether the Isaacs & Speed machine would rifle hot pipe, and if it would rifle hot pipe, whether it would prove efficient and its use practical, I am of the opinion that a reasonable license fee for the Mark Company to have paid and The National Tube Company to have accepted as a license fee for use of a Fell patent rifling machine would have been the sum of twenty-five thousand dollars ($25,000.00).

If this sum was a fair license fee at the time of the infringement, it seems to me to be a fair and reasonable amount to be awarded as damages for the infringement.

INTEREST ON THE AWARD.

Plaintiff in his brief contends that interest should be allowed on the amount of the award from the date of the infringement. The claim for damages being unliquidated, the well-known rule, in my opinion, applies, and no interest should be allowed.

In conclusion, I find and report to the court that the fair and reasonable damage which the plaintiff has suffered and for which it should be awarded judgment against the defendants is the sum of twenty-five thousand dollars ($25,000.00) with an additional allowance awarded to cover costs and expenses of this action estimated to be fifteen thousand dollars ($15,000.00), and amounting in all to the sum of forty thousand dollars ($40,000.00).

Respectfully submitted,

IRA H. CRUM, *Master.*"

(Clerk's Certificate omitted.)

OPINION ON EXCEPTIONS TO MASTER'S REPORT IN NATIONAL TUBE CO. v. MARK ET AL.

UNITED STATES CIRCUIT COURT OF APPEALS
SIXTH CIRCUIT.

NATIONAL TUBE COMPANY,
Plaintiff-Appellant,
v.
CYRUS MARK, ANSON MARK AND CLAYTON MARK, Co-partners and as MARK MANUFACTURING COMPANY,
Defendants-Appellees.
No. 4360.

(Opinion on Exceptions to Master's Report, filed August 20, 1924, as taken from the printed record on file in this court.)

OPINION ON EXCEPTIONS TO MASTER'S REPORT.

(Filed August 20, 1924.)

SATER, District Judge:

The defendant built and used but one infringing machine. It rifled with such machine 184 miles of eight-inch pipe. It did not use or sell the machine, or any pipe rifled by it, or any apparatus for rifling pipe, after the completion of its contract with The Southern Pacific Railroad Company.

The Master allowed plaintiff "as a reasonable license fee" the sum of $25,000. I interpret the term "reasonable license fee" to mean no more and no less than a reasonable royalty. If recovery be based on that ground, should the plaintiff have interest on the amount thus allowed from the date the infringement ceased, or merely from the date of the Master's report? Where a recovery is determined on a royalty basis, interest is computed from the date the infringement ceased. *K. W. Ignition Co. v. Temco Elec. Motor Co.*, 283 Fed., 873, C. C. A. 6; *B. F. Goodrich Rubber*

Co. v. Consolidated Rubber Tire Co., 251 Fed. 617, 624, C. C. A. 7; *Clark & Schieble Toy & Novelty Co.*, 248 Fed., 276, 283, C. C. A. 6. In the *Clark* case, Judge Warrington, speaking for the court, alludes to the fact that the terms "damage" or "compensation" are frequently spoken of as "reasonable royalty." Interest was allowed from the close of the infringing period. He was dealing with a case in which the defendant's conduct was of a "tortious character." In his earlier consideration of Clark's conduct (217 Fed., 763), he found that Clark claimed he should have the benefit of the infringed patent and also the money received from its sale, and at pp. 771 and 772 the purport of his language is that Clark could not be permitted "both to sell and keep his invention."

Where the recovery is of profits and the circumstances of infringement betray fraud or wantonness, interest may be allowed on profits awarded. *National Folding Box & Paper Co. v. Dayton Paper Novelty Co.*, 97 Fed., 331, C. C. A. 6; *Oehring v. Fox Typewriter Co.*, 251 Fed. 584, 588, C. C. A. 2; *B. F. Goodrich Rubber Co. v. Consolidated Rubber Tire Co.*, 251 Fed. 617, C. C. A. 7. Note also Judge Warrington's language in the *Clark* case. There is nothing in the record or in the decision of our Appellate Court (216 Fed., 507) to indicate wantonness or fraud in the defendant's infringement, or that the defendant "started out not to patent an invention," but "to invent a patent," as was held in the *K. W. Ignition Company* case. It follows that no ground for the award of punitive damages exists. As reflecting on the absence of wantonness or fraud is the fact that after the Fell patent had issued on May 26, 1908, the plaintiff, on March 30, 1909, and September 17, 1909, when negotiating with Thorne, as director of purchases for the railroad company, stipulated that Thorne was to take care of any royalty on the rifling process and furnish plaintiff with the necessary license for the manufacture of pipe. See Vol. I, Record, before the Master, pp. 158, 162. It is not likely that such a demand would have been made if plaintiff was sure the Fell patent was non-infringing and valid.

The Master found the defendant made no profit on its contract with the railroad company. No exceptions were taken by plaintiff to that finding. It is true, plaintiff thinks defendant made a profit of $11,000, while the de-

fendant claims a loss of $4,000; but after stating its belief, the plaintiff adds (Brief, p. 2), "the amount involved is too small to consider seriously." The question of profit, if any was made, is dismissed from consideration, and the Master's report on that subject is sustained.

The plaintiff's claim that it is entitled to damages for the aggregate profits it would have made on each of the several steps of conversion, beginning with the ore and ending with the rifled pipe, is extravagant and untenable. Pig iron, steel ingots, slabs, plates, skelp and plain pipe are each merchantable commodities, produced in great quantities by many concerns and sold on the market as separate articles to persons needing them. The plaintiff holds no monopoly on the production of any of them, nor does the Fell patent allude to or mention any of the products of ore preceding the manufactured pipe, or specify that to produce the desired patented result their production by continuous steps is a necessary part of or has anything to do with his invention. He states that "the invention has relation to means for forming grooves or rifles in pipes or tubes." His process begins with the completed pipes or tubes, as appears from his several claims, and the portion of his specification commonly called the description. His invention is entitled "Apparatus for rifling pipes or tubes," and is restricted to the rifling process. The patent does not require that the pipe shall be rifled while still hot from the process involved in their manufacture. That is to say, it does not require that the rifling shall immediately succeed or be continuous of the manufacturing process and while the pipe is still hot. He contemplated the application of his apparatus to either hot or cold pipe, as the user elected, for he says, "the pipe or tube, preferably while heated, is passed between these rolls," etc. The whole value of the rifled pipe is not contributed by Fell's invention. Whether damages or profits be considered (and the latter is out of the case), the principle announced in *Hemolin Co. v. Harway Dyewood & Extract Mfg. Co.*, 166 Fed. 434, C. C. A. 2, applies. The plaintiff's recovery, on whatever ground placed and whatever the amount may be, must be restricted to the defendant's use of the rifling process. It is worthy of note that not only the defendant, but the Youngstown Sheet & Tube

Company, bid for plain pipe at sixty-four and sixty-six cents per foot respectively.

The Isaacs & Speed patented device was first operated in the field on cold pipe. The opportunity for its first practical testing did not arise when it would be used in a factory on hot pipe when and as produced. There is nothing, however, to be found within the terms of the patent which even remotely suggests that their machine was to be used or could be used only on cold pipe. It says nothing about either hot or cold pipe. They evidently knew it could be used, or at least contemplated its use, in connection with hot pipe. See original transcript, 190. They were not called upon to describe every use to which their invention might be put. If they disclosed its use in one environment, or if its use therein was apparent, its use in another and different environment was and is permissible so long as the change requires no inventive skill. It is not material that the patentees did not describe in full all the beneficial functions to be performed by the parts of their device, if those functions are evident in its practical operation and are seen to contribute to the success of such device. They were and are entitled to all the beneficial uses of their patent, whether they knew of them or not, so long as those uses fall within its terms. As early as January 31, 1907 (and that was before Fell's application for his patent was filed), the railroad company was specifying for the rifling of pipe when hot. Original transcript, 197, 198. Even at an earlier date (December, 1906), a like specification was made. Original transcript 201, 202. The record shows that persons acquainted with the rifling of pipe and with rifled pipe, as known on such dates, recognized that pipe could be rifled hot, knowledge of which fact was brought to plaintiff. Knowledge that such could be done, it would seem, must have been gotten from consideration of the Isaacs & Speed patent, which was the only one extant on such dates. Bentley, it is true, said (Original Transcript, 120) Fell devised the first machine that would rifle hot pipe, but he also said (p. 116) that the necessity of limiting the operation of the Isaacs & Speed patent to cold pipe was a mere possibility. That pipe could be rifled when hot by modifications which were within and not a departure from the terms of the Isaacs & Speed

patent appears not only from the foregoing, but to have been provided by the machine made by the defendant at its factory, to be used in case the decision went against it in this court. There is nothing in the Isaacs & Speed patent that suggests the pipe must be pulled onward in its course by a rope, or by other specific device, and it was not beyond the terms of their patent to adopt means for shoving the pipe along; nor is it of importance that the defendants used a less number of rollers than the four shown and suggested in the Isaacs & Speed patent, for that patent specifically states the number of rollers may be greater or less than mentioned therein. Whether it was, as plaintiff asserts, "a half-and-half machine (half Fell and half Isaacs & Speed)," or whether it was a legitimately commercialized form of the Isaacs & Speed machine, is immaterial, for the reason it is not such or claimed to be such, under the circumstances of this case, as infringes anyone's rights. The thought of rifling pipe when cold in the performance of their contract does not ever appear to have been in the minds of the defendants. If it be true, as claimed, that twelve per cent of the pipe rifled when cold was spoiled, it is not to be presumed that the defendants would adopt the process of thus rifling it. In view of the fact that their bid for the unrifled pipe was sixty-four cents per foot, and but three and one-half cents per foot for rifling, the loss of twelve per cent of the pipe valued at sixty-four cents per foot would be prohibitive of rifling it when cold, and, as others conversant with rifled pipe before the Fell patent issued apparently with readiness saw that, with Isaacs & Speed's patent before them, pipe could be rifled when hot, it must be presumed that defendants, with their expert assistants, would have discovered the same thing and would have constructed a device along the lines of the Isaacs & Speed patent, as they did later, had they thought the machine which they did construct and with which they did their rifling infringed on plaintiff's rights.

The insistence of defendants that plaintiff itself would not have performed the contract had it been the successful bidder is not impressive. If it saw fit to farm out the contract and thus bestow the profits, if any, on another, that is not a matter of defendant's concern.

A review of the claims pro and con made by the respective parties is not thought necessary. If considered,

this opinion would necessarily be quite extended. The case is out of the ordinary. That the plaintiff is entitled to a recovery seems clear, for the reason infringement has been found, but, as sometimes occurs in patent cases, it is difficult to fix the basis and amount to be allowed. Plaintiff's claims appeal to me as excessive and not dependable. It so reduced its original bid for rifled pipe at seventy-five cents per foot as to be willing to furnish such pipe at seventy cents per foot. This was doubtless due to the fact that the bidding was competitive. It had filled other contracts at a higher price, but I do not understand the bids on them were of a competitive character. There was no established market value for rifling pipe. The record suggests that plaintiff had been charging for it whatever it could get and varied the price both before and after competition began. It was offered the contract at sixty-five cents per foot of pipe, but refused to accept such offer. If its profits on the contract would have been as great, or even very much less than it now claims, it is not reasonable to believe it would not have accepted the sixty-five cent offer, rather than have the contract go to another party. It is fair to assume the offer was rejected either because a contract at that price would not yield a profit, or would yield a profit too small to be attractive. The defendants, we have seen, rated the unrifled pipe at sixty-four cents per foot and the cost of rifling at three and one-half cents per foot. The Youngstown Company fixed the value of unrifled pipe at sixty-six cents per foot. At whatever cost the plaintiff company itself could have rifled the pipe (and what its claim is in that respect we do not know), its valuation of unrifled pipe per foot could not have differed materially from that fixed by defendants or the Youngstown Company. At a valuation of sixty-four cents for unrifled pipe and three and one-half cents for rifling it, the defendants may be said, on the facts of this case, to have broken even,—neither making nor losing. It is not shown they did not operate economically or skillfully in their rifling work, or that they were materially out of the way in the value fixed by them on the unrifled pipe. I do not think it amiss to say that sixty-seven and a half cents per foot (the price defendants received) fairly represents the cost of rifled pipe. If that be so, then the failure of

plaintiff to get the contract was a loss to it of two and one-half cents on each of the 1,033,262 feet of pipe, or $25,081.55, at which sum I fix its damages. This sum, as it seems to me, will restore to plaintiff all it lost—being what plaintiff would have derived as a profit from its monopoly if defendants had not interfered, but which plaintiff failed to realize because of defendants' conduct. The defendants should also pay the cost of the litigation. No authority has been found or cited which warrants an allowance to plaintiff of a sum for the expenses incurred in the litigation and no award is made in that behalf.

The Master's report and findings are modified to conform to the above, and all exceptions thereto not in harmony with the foregoing are overruled.

An order may be made conforming to the above, and exceptions reserved.

(Clerk's Certificate omitted.)

SPECIAL MASTER'S REPORT ON ACCOUNTING OF PROFITS, OPINION AND ORDER, AND OPINION AND ORDER ON STANDARD OF COMPARISON IN ONEAL v. SAN JOSE CANNING CO.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA,
SOUTHERN DIVISION.

LOUIS ONEAL,
Plaintiff,
vs.
SAN JOSE CANNING COMPANY,
a corporation,
Defendant.
IN EQUITY No. 1307.

SPECIAL MASTER'S REPORT ON ACCOUNTING OF PROFITS.

To the Honorable the Judges of the above-entitled Court:

By the interlocutory decree herein filed and entered June 23, 1925, it was adjudged "that said plaintiff is entitled to an accounting of the profits made by said defendant as a result of said infringement of said patent and patent rights for the years beginning with and including the year 1923 down to the present time," and the undersigned was by said decree appointed special master to take and report the evidence, together with my findings and conclusions thereon. It is to be noted that although the statute allows a plaintiff damages as well as profits, a requirement which has been interpreted as giving to the plaintiff whichever shall be the greater, the decree as framed makes no mention of damages; and the master, accordingly, has no authority except to find profits. This point has been called to the attention of the parties, and it is understood and apparently acquiesced in.

The proceedings before me follow.

(1) On June 26, 1925, the master signed an order for a statement, under Rule 63, presented by plaintiff.

There is no proof in my files that said order was served, nor was the original returned. Meanwhile an appeal had been taken from the interlocutory decree, and on January 18, 1926, 10 Fed. (2d) page 100, the Circuit Court of Appeals affirmed the decree below as to infringement of claims covering the device, but reversed it as to claims covering the method of packing, stating that this method was nothing more than the obviously necessary manner of operating the mechanism.

(2) On September 1, 1926, the master signed a second order for filing of an account under Rule 63, presented by plaintiff and substantially similar to the one issued in 1925. This order is separately returned.

(3) On October 14, 1926, defendant filed its sworn statement of account, preceded by an extended argument. This account was at the final hearing formally introduced by defendant in evidence, and is separately returned.

(4) Thereafter plaintiff noticed a motion for January 30, 1928, for a further sworn statement of account under Rule 63, and on that date defendant presented a motion for modification of the order of September 1, 1926. The above two notices of motion are herewith separately returned. Argument was had on said day, Clarence A. Linn, Esq., appearing for plaintiff and A. Schapp, Esq., appearing for defendant.

(5) Thereafter, on January 31, 1928, the master signed an opinion and order, which is annexed to this report, briefly to the effect that evidence was needed to determine what standard of comparison was open to defendant, and a hearing was ordered for February 27, 1928, on that question.

(6) On February 27, 1928, I was attended by the parties, Clarence A. Linn, Esq., appearing for plaintiff, R. M. J. Armstrong, Esq., and A. Schapp, Esq., appearing for defendant, and evidence was taken on the question of the available standard of comparison, which evidence, contained in a pamphlet volume marked "Volume 1" in 57 pages and in two physical exhibits, Defendant's Exhibits 1 and 2, is herewith separately returned.

(7) Following this hearing briefs were filed, by the defendant on May 9, 1928, and by the plaintiff on May 18,

1928. Thereafter, on May 21, 1928, the master signed and filed his opinion and order on the question of the standard of comparison, which order is annexed to this report and, with the first opinion referred to, is to be considered a part thereof. Briefly, it was decided that hand packing aided by either Exhibit 1 or Exhibit 2 was available to defendant as a standard of comparison in 1923 and 1924; plaintiff's motion for a further statement of account being denied and defendant's motion to amend the order being granted. June 5, 1928, was appointed as the time for further evidence to determine profits.

(8) On June 5, 1928, I was attended by the parties, Clarence A. Linn, Esq., appearing for plaintiff and R. M. J. Armstrong, Esq., and A. Schapp, Esq., appearing for defendant. Evidence was taken, which was stenographically reported, and is herewith separately returned as Volume 2. The matter was thereupon submitted without further argument, and it was stipulated by the parties that the provision of Rule 114 of this court providing for the announcement of the report in draft, with opportunity to the parties to file objections with the master, should be waived; and that the master's report when ready should be signed and filed as his final report, subject to exceptions to be filed with the Clerk.

The above statement is a full statement of the proceedings before me in this accounting, and the statement made of the evidence received and returned covers all the evidence upon which this report is based.

Responding to the directions in the interlocutory decree, I conclude and report as follows:

1. Defendant's profits, being its savings by reason of the infringement found by the decree, amount to the sum of $662.19, for which sum plaintiff should have the final decree of this Court against defendant.

2. In addition to said sum, plaintiff should recover interest thereon at the rate of 7% per annum, beginning January 1, 1925, being approximately the close of the infringing period, to date of the final decree herein, and interest thereafter on the amount of the total profits and accrued interest, at the same rate, until said judgment and decree is paid.

The above is hereby settled, signed and filed as my final report, herein, and the parties notified of said action by mail, this 8th day of June 1928.

H. W. WRIGHT,
Special Master.

(Caption Omitted.)

MASTER'S OPINION AND ORDER.

Equity Rule 63, requiring parties accounting before a Master to bring in their respective accounts in the form of debtor and creditor, undoubtedly originated in and has its most obvious and ready application to ordinary accounts such as those of a partner or trustee, or the like, where a set of books would show money items on each side of the account. The practice prescribed obviously makes it possible for the complainant, upon receiving the discovery embodied in the Rule, to accept certain items and narrow the hearing before the Master to items that are disputed either in fact or in law. Accountings of profits in patent cases differ widely from the situation presented in ordinary accounts, as anyone experienced in such accountings will realize. Books of account in patent accountings may serve as sources of material, but rarely contain the ultimate figures of debit and credit desired, making necessary the use of estimates. The machinery of Rule 63, therefore, labors considerably in the effort to grind out the results desired, but since discovery is of right and the fundamental principle of narrowing the issues at the hearing is here equally pertinent, Courts of Equity in this country have usually applied Rule 63 to patent accountings and it is the practice in this District. The very broad powers of the Master under Rule 62 would, in my opinion, give him power to require the filing of the statement under Rule 63, even if the latter did not exist. Though it is customary here for the Master to order the filing of a debtor and creditor statement as the first step in the accounting, the practice adapted to settle the issues is quite unsettled. It must not be forgotten, also, that while the Master has broad powers of regulation, he is necessarily ignorant of the requirements of the particular situation and it, therefore, falls in the first

instance upon the Plaintiff's counsel to draft the Master's order requiring the filing of the account under Rule 63, and to insert therein the particular details in the nature of discovery, which, in counsel's opinion are best adapted to ascertain the profits due. Equally, it would seem, is the burden then cast upon counsel for the accounting Defendant either to obey the order as given or, by timely motion before the Master, to attempt a correction of the Master's order. I see no reason furthermore why, in this described program of settling the issues, there may not be occasions for taking evidence just as in Equity evidence may be taken in a preliminary hearing in support of a plea. For example, it seems to me that it would be a correct and desirable practice in accountings before the Master that there be a preliminary hearing that would be proper in particular cases to determine the standard of comparison to be applied in the particular case. An experience of eighteen years as a Master of this Court has not determined any settled practice in this regard, and these observations are called forth solely by the facts of the present case with the idea that they should be generally applicable.

The facts of the present situation are as follows:

On June 26, 1925, the Master signed an order for a statement under Rule 63 with certain detailed requirements under seven headings deemed by Plaintiff necessary to determine the profits made by the Defendant from canning string beans packed asparagus style. Thereupon, as is not unusual, the matter rested in the Master's files. There is no proof in my files that said order was served, nor was the original returned. Meanwhile an appeal had been taken from the interlocutory decree, and on January 18, 1926, 10 Federal 2d, page 100, the Circuit Court of Appeals affirmed the decree below as to infringement of claims covering the device, but reversing it as to claims covering the method of packing, stating that this method was nothing more than the obviously necessary manner of operating the mechanism.

On September 1, 1926, there was presented to me by Plaintiff and signed a second order for filing of an account under Rule 63 substantially similar to the one issued in 1925.

On October 14, 1926, there was filed with me Defendant's verified statement of account. This statement is preceded by a long discussion setting forth the modification of the decree by the Court of Appeals and an argument on the law largely directed to development of Defendant's view that the original Master's order was too broad. The Master does not read documents filed with him, unless counsel moves them to his attention.

Following this statement of the law is an account giving some of the discovery ordered by the Master's order and disregarding, to a large extent, the balance of the order, and concluding with a statement of the profits on the theory that it was open to Defendant to use as a standard of comparison the costs of packing string beans asparagus style by hand. Obviously the practice followed by the Defendant of disobeying the Master's order and making discovery according to his own notions of what the order should have been was unsound, and, if it were thought necessary, would expose the Defendant to punishment for contempt.

Defendant's counsel should have moved for a modification of the order.

Following this filing of the account, Plaintiff noticed a motion for the 30th of January, 1928 for a further sworn statement of account under Rule 63, and on the date named, I was attended by Clarence A. Linn, Esquire, counsel for Plaintiff, in support of the motion, and by A. Schapp, Esquire, for Defendant. At the same time, Defendant presented a motion for modification of the order, the purport of which was to confine the costs to the use of the infringing mold or device and to introduce into the details required an item of cost of filling the can by Defendant's selected standard of comparison. No evidence was offered or taken, and the only light I have on the situation is the argument of counsel, aided to some extent by the disclosure made in the account filed.

From this account, as well as from the argument, it would appear that the first issue to be decided is that of the proper standard of comparison. From the account, page 5 and following, I gathered that Defendant was a licensee of the Plaintiff under the patent in suit, paying therefor a yearly royalty of five hundred ($500.) dollars. A renewal of the license for 1923 was not accepted by the

Defendant, who, during that year and 1924 used the device decreed to be an infringement.

In 1925 and 1926, as stated in this account, page 19, the Defendant packed its asparagus style beans by hand. Its account of profits is founded on the difference in cost between the costs of filling in 1923 and 1924 and compared with the greater cost of hand filling in 1925 and 1926, showing a saving by the infringement of $662.19.

The complainant's contention, on the other hand, is that the packing of string beans whole, lengthwise in the can, in the manner of asparagus stalks was not known in the art until plaintiff's device, two semi-circular molds with certain accessories, which bunch the beans and facilitate their insertion into the cans, created that particular style of packing; that prior thereto, string beans were not packed asparagus style by hand, but were packed cut up into pieces. Plaintiff's contention, accordingly, is that the selected standard of hand packing is not applicable under the law and that Plaintiff is entitled to the entire profits of Defendant for beans packed by the infringing device in the asparagus style originated by Plaintiff, there being no hand operation for such packing then known.

It is, of course, settled law that a device or method not known at the time of the infringement is not available as a standard of comparison, 277 Federal, 177; *Walker,* Section 725. If Plaintiff is correct on the facts, his claim that he is entitled to all the profits of beans packed asparagus style, without reference to any standard comparison, would seem on my present understanding to be correct.

Considering the delay and the failure of Defendant to earlier move in modification of the order, I might well grant a motion to comply with the order as given. The unsettlement of the practice seems, however, to suggest that before Defendant is required to make a further accounting, a more lenient view should prevail and that we should now proceed as we should have proceeded if defendant had moved in modification of the order as soon as it was given.

The point upon which light is needed by evidence is as to the state of the art in the years 1923 and 1924, with a view of determining the proper standard of comparison to be applied. The burden of proving the standard of comparison, whether it be the hand operation or some other means,

rests on Defendant, and a hearing should be had at which Defendant, as the moving party, will present evidence, the Plaintiff to be heard in reply. If Defendant does not convince the Master that hand operation, or some other standard of comparison, was open to Defendant during the period of infringement, Defendant must be prepared within a brief time thereafter to file a further statement of account of its entire profits in packing beans asparagus style as prayed for by Plaintiff.

I will appoint Monday, February 27, 1928, at 10 o'clock A. M. at my office, Room 706 at 68 Post Street, San Francisco, California, as the time and place for hearing evidence as to the standard of comparison to be used.

Dated January 31, 1928.

H. M. WRIGHT,
Special Master.

(Caption Omitted.)

SPECIAL MASTER'S OPINION AND ORDER ON STANDARD OF COMPARISON.

On September 1, 1926, the master made his order for the filing of a sworn statement of account by defendant. On October 14, 1926, the account was filed. On January 12, 1928, plaintiff noticed a motion for the filing of a further account, conformable to the master's order, to be heard on January 30, 1928. The parties appearing on that day, defendant filed a motion to amend the master's order, and argument was heard on both motions. On January 31, 1928, the master announced to the parties his opinion and order, in substance to the effect that before proceeding further the defendant should prove that hand packing of string beans asparagus style was a known alternative, open to defendant at the time of the infringement found by the decree, and a hearing on this issue was ordered and was had on February 27, 1928. At the request of the parties, the matter was submitted at the close of the hearing on briefs to be filed at times stated. No briefs having been filed, the master on May 2, 1928, notified the parties that defendant's brief should be filed on or before May 7, 1928, a date subsequently extended by the master to May 9, 1928;

plaintiff's reply to be filed on or before May 14th, and defendant's final brief on or before May 21, 1928. The defendant, on May 9th, filed a brief; plaintiff's brief was filed on May 18, 1928; it seems unnecessary to await defendant's reply.

The evidence taken shows that during the season in 1922 for packing string beans, which season begins each year toward the last of July, the defendant paid a royalty to plaintiff of $500. At that time the application of Rancadore, General Manager of defendant, for the mold later declared to be an infringement of the Greco mold of plaintiff was before the patent office. Toward the end of July, Mr. Rancadore asked one of his employees to get up a device which would facilitate hand packing of string beans asparagus style. The result was the model Exhibit 1. This is a block of wood around which at each end was bent and secured a piece of half-round iron, forming upwardly projecting arms within which a bunch of string beans could be placed on the block, after which the ends were trimmed off with a knife. The upwardly extending iron prongs fulfilled the function of gauging the quantity of beans to be packed in the can and of retaining them while the cutting was going on. The bunched string beans, after having been trimmed, were then taken out of the device by hand and placed in the can. Defendant's manager, Mr. Rancadore, having tried this operation with some half dozen cans, did nothing further with it. In the seasons of 1923 and 1924 payment of royalty was refused, and defendant packed by the Rancadore mold, declared later to be an infringement.

During the seasons of 1925 and 1926 defendant packed by hand, using to facilitate hand packing the device in evidence as Exhibit 2. This is the same as Exhibit 1 except for the fact that the block projects at each end beyond the iron uprights, affording thus a surface to facilitate a clean cut with the knife.

The account which defendant has filed is based upon a comparison between the cost in filling the can with string beans by the use of the infringing mold and the cost of trimming the beans and filling the can by hand packing aided by Exhibit 2.

The facts stated are abundantly proved, with every evidence of plausibility and with no opposing evidence. It

is not claimed that Exhibit 2 is an infringing device, and it seems obvious that it is not. The conclusion therefore follows that the hand packing method of defendant as described and as practiced in the seasons of 1925 and 1926 had been substantially developed by him as early as July 1922; that he could have used hand packing aided by either Exhibit 1 or Exhibit 2 in the years 1923 and 1924 when he used the infringing mold, and that therefore this hand packing as practiced is a proper standard of comparison to be used in this accounting. The fact that there is a slight difference, as described, between Exhibit 1 and Exhibit 2, is immaterial. Exhibit 1 could have been used, but the modification by extending the block to facilitate cutting was obvious and a development that ensued naturally as soon as the method was put in practice.

Plaintiff's motion for a further statement, based as it is upon the theory that hand packing was not open to defendant, must be denied. No other grounds of objection have been presented that I know of.

It remains to rule on defendant's motion to amend the order for the account. The first item of defendant's motion is to insert in the order at line 23 the words "by means of the infringing mold," so that the requirement will be, "a sworn statement of account in debtor and creditor form of the profits made by you from canning string beans, packed asparagus style, by means of the infringing mold, during the year 1923" etc. This motion is granted.

Sub-paragraph (1) requires a statement of "the quantity of beans packed by you asparagus style and the amount of money paid therefor." If plaintiff were entitled to all the profits of defendant for beans packed asparagus style, this requirement might well enter into the accounting. Since, however, the method of packing in this way has not been sustained by the Circuit Court of Appeals, and since it is clear that it was open to defendant to pack beans asparagus style, by hand, the only profits to be accounted for would seem to be dependent upon the cost of the packing by the infringing mold, as compared with the cost of hand packing. This is the theory of the account as filed, and as the master is at present advised the theory is correct.

The next part of the motion is to cancel paragraph (4), as follows: "Cost of canning such beans, giving the

items of such cost and the cost of each item," and to substitute therefor the words "cost of filling the cans by means of the infringing mold." The motion is granted.

It is next moved to cancel paragraphs 5, 6, and 7 of the order, reading as follows:

"(5) Cost of sale or marketing.

(6) Any other costs properly itemized.

(7) The profits derived by you in such business,"

and to substitute therefor the following: "cost of filling the cans by means of a standard of comparison." The profits to be accounted for seem plainly to be concerned solely with the cost of filling the cans, and since hand packing was a proper standard of comparison, open at the time of the infringement, the change seems proper. The motion is granted.

There seems no reason why the preliminary stage of the accounting, having to do with preliminary discovery by defendant by the accepted method of filing a sworn statement of account, should not now be deemed complete, and why the main hearing on the accounting should not proceed. I will appoint Tuesday, June 5, 1928, at 10:00 o'clock A. M., at my office, room 706, No. 68 Post Street, San Francisco, California, as the time and place for further hearing herein. The parties may then present such evidence as they see fit, to aid the master in determining profits under the decree. If no such evidence is offered, I will report profits on the basis of defendant's account already filed.

The parties will advise me in advance if a reporter is likely to be required.

Dated May 21, 1928.

H. M. WRIGHT,
Special Master.

(Endorsed) Filed June 8 1928
Walter B. Maling, Clerk.
By A. C. Aurich, Deputy Clerk.

DISTRICT COURT OF THE UNITED STATES

NORTHERN DISTRICT OF CALIFORNIA,
SOUTHERN DIVISION.

AT A STATED TERM of the Southern Division of the United States District Court for the Northern District of California, held at the Court Room thereof, in the City and County of San Francisco, on Wednesday, the 7th day of November, in the year of our Lord one thousand nine hundred and twenty-eight.

PRESENT: The Honorable FRANK H. KERRIGAN,
District Judge.

LOUIS ONEAL
vs.
SAN JOSE CANNING COMPANY, a corp. } No. 1307.

Plaintiff's Exceptions to the Master's Report on accounting of profits, heretofore argued and submitted, being now fully considered, it is ordered that said exceptions be and they are hereby overruled, and that said report be and the same is hereby confirmed.

OPINION OF THE CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT IN GORDON FORM LATHE CO. v. WALCOTT MACHINE CO., NO. 5111, DECIDED APRIL 12, 1929, 32 FED. (2d) 55.

1. Patents Key 328—No. 1,542,803, claims 1, 2, 28-30, 33, 34, and 39-42, for tool-moving and tilting mechanism in lathe, held valid and infringed.

Claims 1, 2, 28-30, 33, 34, and 39-42 of Gordon and Redlin patent, No. 1,542,803, for tool-moving and tilting mechanism in lathe for nongeometric figures, *held* valid as involving invention, and not anticipated, entitled to broad and liberal construction, and infringed.

2. Patents Key 327(13)—Though successive decisions for patentee in Patent Office, Court of Appeals, and District Court are binding only on priority, they strengthen presumption of patentability (35 USCA § 63).

While successive decisions in favor of patentee, as against alleged infringer, by Patent Office tribunals, by Court of Appeals of District of Columbia in interference proceeding, and by District Court in action under Rev. St. § 4915 (35 USCA § 63), bind parties only on question of priority of invention, yet they greatly strengthen presumption of patentability arising from issuance of patent.

3. Patents Key 34—Court must first look to state of art in determining question of invention.

In determining whether invention is disclosed by patent, court must first look to the state of the art.

4. Patents Key 66(1)—Patents not disclosing purpose of subsequent patent, and restricted to substantially different purpose, are not anticipations.

Patents cannot be considered as anticipations, which do not disclose purpose, means, and mechanism for accomplishing end of patent in suit, and which are restricted to accomplishment of substantially different and limited purpose.

5. Patents Key 36(2)—That prior devices were not accepted and adopted to meet demand is strong evidence that change involved more than mechanical skill.

That prior devices, though adaptable to meet demand met by patented device, were not accepted by the trade and so adapted, strongly indicates that changes were not obvious, and involved more than mechanical skill.

6. Patents Key 235(1)—Superiority of operation does not negative infringement.

Superiority of operation does not of necessity negative infringement.

7. Patents Key 235(1)—Accomplishing same result more efficiently, but by same means, operating in same manner, is infringement.

To accomplish same result, though more efficiently, by employment of substantially the same means, or their equivalents, operating in substantially the same manner, is infringement.

In Error to the District Court of the United States for the Eastern District of Michigan; Charles C. Simons, Judge.

Suit by the Gordon Form Lathe Company against the Walcott Machine Company. From an adverse judgment [20 F. (2d) 673], complainant brings error. Reversed in part and remanded.

F. O. Richey, of Cleveland, Ohio (John W. Michael and Bottum, Hudnall, Lecher, McNamara & Michael, all of Milwaukee, Wis., and Richey & Watts, of Cleveland, Ohio, on the brief), for appellant.

J. L. Stackpole, of Boston, Mass. (Otis A. Earl, of Kalamazoo, Mich., and H. L. Kirkpatrick, of Boston, Mass., on the brief), for appellee.

Before MOORMAN, HICKENLOOPER, and KNAPPEN, Circuit Judges.

HICKENLOOPER, Circuit Judge. The appellant originally instituted its action in equity in the District Court for an injunction and accounting for alleged infringement of patent No. 1,542,803, issued June 16, 1925, upon application of Charles Gordon and Alfred W. Redlin, filed July 19, 1920, for a lathe. The District Court found the claims in issue valid, but not infringed. The parties to this appeal will be referred to by the designations of complainant and defendant, by which they were known in the court below. Claims 1, 2, 12, 23, 24, 28-30, 33, 34 and 39-42 are in issue.

[1] The patent in suit relates particularly to lathes for turning irregular or noncircular bodies of metal, such as cams, cheek pieces of cranks, etc., otherwise referred to by counsel as nongeometric figures. The separate units of the machine are designed with a view to arrangement in rank and the turning, in one operation, of the multiple cams on an automobile cam shaft. The patent is here attacked as

void for want of invention, and, if valid, lack of infringement is urged in defense. The claim of invention is predicated both upon the aggregate organization of the separate units in rank and upon the combination of means for the operation of the single unit. It is apparent, however, that unless invention exists in organizing the single unit, the mere arrangement of such units in rank, so as to work simultaneously upon a number of different cams mounted upon a single shaft, would not constitute such invention. We are therefore primarily concerned with the question of invention, as it relates to the separate unit of the complainant's machine, and, if the patent be found valid, then with the question of infringement by the defendant's machine.

Prior to about 1920 such cams were cast and then rough-ground to approximate dimensions. They were then case-hardened and reground to accurate dimensions. Such grinding operations were expensive, dirty, and to some extent dangerous, and Gordon conceived the idea of substituting a turning operation for the initial rough-grinding. After hardening, the steel cannot be turned, and the final or finishing grinding operation is still practiced. In order to successfully accomplish the turning operation upon a revolving blank, the work being revolved and moved transversely of the cutting tool, the tool must of necessity be moved forward and back in a plane transverse the axis of the work, so as to trace the outline of the finished cam or other work; and such tool must likewise be oscillated in the plane of its reciprocating movement, so that it may always maintain the substantially normal cutting angle in relation to the surface of the work, and neither skip and scrape, nor gouge or "hog," such work.

To accomplish these results, Gordon and Redlin provided two cams adjacently mounted upon a shaft turned in synchronism with the revolution of the work. Independent of these cams, but suitably placed, a plate or flat rocker arm, referred to as the frame, was pivotally suspended from a supporting shaft. This permitted of a swinging movement to and from the work. To this frame was affixed a roller bearing contacting with one of the cams, and a spring tending to draw the frame toward such cam and to hold said roller in contact therewith. The tool

holder was also mounted on the frame adjacent to the work, and the angularity of the tool to the work was controlled by the other cam and a bell crank lever, with roller bearing and spring adapted to hold such bearing upon its cam. Neither of the controlling cams were replicas of the work to be cut, but both were more or less arbitrarily designed to accomplish the dual purpose of swinging the tool to and from the axis of the work, and of oscillating the tool at or near its cutting edge, so that the normal angle of the tool to the work might be continuously maintained.

Of the claims in issue, claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41, and 42 relate to the tool-moving and tool-tilting mechanism above described. Claims 12, 23, and 24 relate to matters of general organization and automatic stopping means, and the subject-matter of these claims was not pressed upon argument, is said not to be incorporated in defendant's machine, and is not here considered. Of the claims relating to tool-moving and tilting mechanism, claim 2 is admittedly typical and reads:

> "2. In a lathe the combination of a rotary work holder, a tool holder provided with a cutting tool, movable towards and from the axial line of the work holder and angularly adjustable in a plane transverse to the axis of the work holder, cams adapted to vary the distance between the point of the tool and the axial line of the work holder, and to vary the adjustment of the tool for maintaining proper cutting and clearance angles of the tool to work of noncircular contour, means for synchronously rotating the work holder and cams, and means for simultaneously causing relative movement between the work holder and tool holder axially with relation to the work holder."

The Gordon and Redlin lathe obviously has its limitations and its disadvantages, if not defects. The tool is pivoted at, or substantially at, its point, thus requiring it to turn too rapidly and over too great an arc when cutting long-nosed or sharp-pointed cams. This makes it impossible for the tool to follow at normal angularity the desired contour immediately after turning such sharp nose, and there exists a tendency to leave excess metal on the far side of the point. The necessities of commercial construc-

tion and the use of the roller upon the tool-reciprocating cam, in which a depression or hollow is used to withdraw the tool from the center of rotation of the work, likewise limits the extent to which the tool can be withdrawn from the axis of the work, and thus limits the length of the nose or irregular projection which the device can cut, as a practical matter. Notwithstanding these defects and limitations, a comparatively large number of the machines have been marketed commercially, a great many cams and crank cheeks have been successfully turned, and some of such machines are still rendering satisfactory service. The general utility of the device as a commercial and operating machine would seem to be established, and, if it has been supplanted, it is more probable that this was due to the development of the defendant's machine, which avoids some of the disadvantages of, and does some types of work better than, the complainant's machine. On the degree of operability necessary, see *Hildreth v. Mastoras,* 257 U. S. 27, 34, 42 S. Ct. 20 (66 L. Ed. 112).

[2] The broader claims of complainant's patent, numbered 2, 28, and 29, have been the subject of direct adversary contest between the complainant and H. W. Melling, inventor of defendant's machine, in several other tribunals. During pendency of the Gordon application in the Patent Office, Melling filed his application for patent upon the alleged infringing machine, February 27, 1923. A patent No. 1,512,995, subsequently issued October 28, 1924, and defendant's machine is fully described therein. An interference was declared, and the interference proceedings passed successively to decision before the Law Examiner, the Examiner of Interferences, the Examiners in Chief, the Commissioner of Patents, and the Court of Appeals of the District of Columbia. In each of these tribunals priority of invention of the claims in interference was awarded to Gordon and Redlin. Melling thereupon brought action under R. S. § 4915 (35 U. S. C. A. § 63), in the District Court for the Northern District of Ohio, making the complainant here defendant therein. The issue thus raised was again decided in favor of Gordon and Redlin. 14 F. (2d) 437. In all of these proceedings, and especially in the last mentioned, the question of patentable novelty was directly presented to the attention and consideration of

the several tribunals. Cf. *Palmer Pneumatic Tire Co. v. Lozier,* 90 F. 732, 736 (C. C. A. 6). The prior art was fully considered. The interference was not dissolved for want of patentable novelty, and the bill under R. S. § 4915, was not dismissed for that reason. While all this may go no further than to bind the parties upon the question of priority of invention, unless there is "thorough conviction to the contrary" (*Haughey v. Lee,* 151 U. S. 282, 285, 14 S. Ct. 331 [38 L. Ed. 162]; *Computing Scale Co. v. Standard Scale Co.,* 195 F. 508, 515, 516 [C. C. A. 6]), yet it greatly strengthens the presumption of patentability which arises from the issue of the patent to complainant (*Hildreth v. Mastoras, supra,* at page 32 of 257 U. S. [42 S. Ct. 20]).

[3] A definition of what we conceive to be the true inventive step of Gordon and Redlin, in the light of prior practices and in view of the prior art patents, at once disposes of the question of anticipation and confirms us in the opinion held by all other tribunals considering the question, including the District Court in this action, that invention is disclosed by the patent to complainant. In determining such inventive step, the court must first look to the state of the art. *Eibel Process Co. v. Minnesota & Ontario Paper Co.,* 261 U. S. 45, 63, 43 S. Ct. 322 (67 L. Ed. 523). The prior art patents most strongly relied upon, and clearly the most pertinent, are those to Brophy, No. 649,905, May 22, 1900, and Montreuil, No. 701,217, May 27, 1902.

The patent to Montreuil related particularly to turning articles of elliptical form in cross-section. By the employment of a sliding tool support as a part of two pantographs, tied together by link arrangement and moved by an eccentric of proper size, making two revolutions to each revolution of the work, the tool was made to traverse a circular orbit in synchronism with the revolution of the work, and at the same time to maintain substantially the normal angularity to the work. By the means employed the Montreuil lathe could turn only an ellipse, and the patent neither suggests nor discloses means for turning an irregular or nongeometric figure. The patent does suggest the necessary function of tool movement, reciprocating in a plane perpendicular to the axis of the work, with the maintenance of the normal angularity of tool to work, but

manifestly no patent may issue for these functions, but only for the means or elements of the machine by which the result is accomplished.

The same observations are applicable to the patent to Brophy. This invention related to an attachment for automatic lathes, and had for its object the provision of mechanism for cutting eccentric grooves in a metal blank. During the initial period of operation the Brophy lathe operated as the ordinary engine lathe. Such operation was continued until the point was reached at which it was desired to cut the eccentric; that is, until metal had been cut away from the outer circumference of the blank to the outer point of the circumference of the eccentric, and thereafter crescents were cut from the blank, opposite the outer point of the circumference of the eccentric, by employing a spring and cam to force the tool forward upon rotation of the work. Since the eccentric thus being formed passed in a circular orbit about the axis of the revolving work, it likewise became necessary for the cutting edge of the tool to perform an orbit, and this was accomplished, and substantially normal angularity to the work was maintained, by the use of an eccentric cam to tilt the tool holder synchronously with its reciprocatory movement and the revolution of the work. This patent also recognizes the necessity of synchronous reciprocatory movement of the tool and an oscillation of the tool to maintain its normal angularity to the work. Brophy neither suggests nor discloses means for cutting other than an eccentric of geometric form.

The patents to Huston, No. 494,864, and to Diehl, No. 607,987, more remotely pertinent, are for metal cutting mechanisms of the boring mill type. In Huston the tilting of the tool to maintain the normal cutting angle is not considered a necessary function, but the use of cams to control the path of the tool in conjunction with a turning of the tool upon its axis vertical to the surface to be cut is disclosed. The same necessity of turning the tool to cut an ellipse in a plate upon a revolving work table is disclosed in the patent to Diehl, and by Diehl this result is accomplished by the use of an eccentric, instead of the cams of Huston. Neither Huston nor Diehl discloses the Gordon mechanism.

[4] In none of the patents cited is any effort shown to devise, or disclosure made of, means for oscillating the tool,

in synchronism with its reciprocatory movements and the revolution of the work, by the use of an appropriately shaped cam, movable frame, and bell crank lever tool support. None contemplates the turning of irregular or nongeometric forms. Those patents cannot be considered as anticipations which do not disclose the purpose, means, and mechanism for accomplishing the end of the patent in suit, and which are restricted, by the mechanisms disclosed, to the accomplishment only of a substantially different and limited purpose. *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U. S. 45, 66, 43 S. Ct. 322 (67 L. Ed. 523); *Canada et al. v. Michigan M. Iron Co.*, 124 F. 486, 493 (C. C. A. 6); *Munising Paper Co. v. American Sulphite Pulp Co.*, 228 F. 700, 703 (C. C. A. 6); *Hobbs et al. v. Beach*, 180 U. S. 383-392, 21 S. Ct. 409 (45 L. Ed. 586); *Fulton Co. v. Bishop & Babcock Co.*, 284 F. 774, 777 (C. C. A. 6). *Cf. Outlook Envelope Co. v. General Paper Goods Mfg. Co.*, 239 F. 877 (C. C. A. 2). It is true that the mechanism of the Brophy patent can be so reorganized as to cut a cam or other nongeometric figure, but this is done only by substituting for the eccentrics of Brophy the more or less arbitrarily shaped and specially designed separate control cams of the patent in suit. Such reorganization constitutes incorporating into the machine of Brophy the essence of the Gordon invention to accomplish the Gordon result. Such an organization was neither conceived nor disclosed by Brophy, and the possibility of reorganization, so as to reveal in the machine of Brophy the actual disclosures of Gordon, will not convert the patent to Brophy into an anticipation. *Cf. Topliff v. Topliff*, 145 U. S. 156, 161, 12 S. Ct. 825 (36 L. Ed. 658); *Clough v. Barker*, 106 U. S. 166, 175, 1 S. Ct. 188 (27 L. Ed. 134); *Rockwood v. General Fire Extinguisher Co.*, 8 F. (2d) 682-686 (C. C. A. 2); *Block v. Nathan Anklet Support Co.*, 9 F. (2d) 311, 312 (C. C. A. 2). As stated by the District Judge, the reorganization itself "indicated inventive thought."

[5] If we are to look to the prior art and the specifications to determine the true nature of the invention, the precise inventive step of Gordon and Redlin would seem to lie in combining with the means for producing reciprocatory movement of the tool, old in the art, the means for controlling the oscillatory movement of such tool by a separate

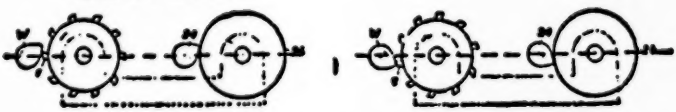
and specially designed cam, spring, and bell crank lever, in such organization that the means for both reciprocatory and oscillating movement, working in synchronism with each other and with the rotation of the work, could cut a cam, crank cheek, or other nongeometric form. Although the demand for such a machine tool had long existed, such combination had not before occurred to any one. The devices of Brophy and Montreuil, though adaptable, were not accepted by the trade and so adapted. Such fact strongly indicates that the changes were not obvious and involved more than mechanical skill. *Potts & Co. v. Creager,* 155 U. S. 597, 15 S. Ct. 194, 39 L. Ed. 275; *Diamond Rubber Co. v. Consolidated Rubber Tire Co.,* 220 U. S. 428, 31 S. Ct. 444, 55 L. Ed. 527.

The present patent is in a very true sense generic, and the patentee a pioneer in this particular branch of the art. The machine had commercial utility and was accepted by the trade, and its manufacture was reasonably successful until thrown into competition with the infringing machine, which avoided the chief defect, heretofore mentioned, and did not have some of the limitations of the patented device. The claims of the patent in suit were considered as entitled to broad, liberal construction in the Patent Office proceeding by Judge Westenhaver in the proceedings under R. S. § 4915, and by the District Judge below. We think that such claims are entitled to this liberal construction, and concur in the opinion of the other tribunals that the patent discloses invention and is not anticipated, and that the generic claims are valid.

We then turn to the question of infringement. It is in evidence that Melling, the designer of defendant's machine, was called upon as an expert in mechanics to inspect one of the complainant's machines in operation at the plant of the Jackson Motor Shaft Company. Upon arrival he found that the tool left "a lump on the work just below the nose of the cam" by reason of the rapidity with which the tool oscillated on turning the nose, and that the noise and jar of the bell crank lever falling upon the cam controlling this motion was such as to convince him that the design was impractical. Melling then went to his shop and with sketch and model cams, plates, and rollers, commenced to experiment for the adaptation of the principle of the Blanchard lathe to supply the reciprocating motion of the tool.

The Blanchard lathe was old in the art, and while it itself had been used exclusively in wood-turning operations, the principle of the Blanchard lathe had been used in the rough-grinding of cams prior to Gordon. In the Blanchard lathes a pattern is used of the precise shape and dimensions of the cross-section of the finished work. The cutting means used is a circular cutter with multiple teeth, or, in the grinding operations, a grinding wheel. This cutter is mounted adjacent the work upon one end of a reciprocating carriage or frame. On the other end of this frame is mounted a circular and revolvable guide plate bearing upon the pattern cam. The distances between the axes of the pattern cam and the work is the same as that between the axes of the cutter and the guide plate. The work and pattern are on the same relative sides of cutter and guide. The guide plate is held firmly against the pattern cam by spring tension, and the reciprocatory movement of the cutter to and from the work, to produce in the work a replica of the pattern, is thus produced by equality of revolution of the work and pattern cam.

BLANCHARD



The use of the Blanchard lathe, as such, involves no question of oscillation of the cutting tool. It is obvious that in order to produce in the work, in cross-section, a replica of the pattern cam, the diameter of the circle traveled by the teeth of the revolving cutter must be exactly the same as the diameter of the circular guide plate. Thus, as the pattern cam and work are revolved at equal speed, the cutting edges of the tool successively maintain the same relative position on the work as the point of contact of the guide plate maintains on the pattern cam. It is also obvious that, where the pattern used is cam-shaped or irregular in design, the point of contact between the nose of the cam and the guide plate, and hence the point of cut on the work, will at times be above and at times below the plane of the axes of the work, cutter, pattern, and guide.

It is insisted that Melling simply applied the principle of the Blanchard lathe in designing his machine, substituting a single oscillating tool for the revolving circular cutter of the Blanchard lathe, and that by reason of the adoption of the principle of the Blanchard lathe, the tool being pivoted at a point the same distance from its cutting edge as the radius of the circular guide plate (assumed to be substantially remote from the cutting edge), the size of the arc through which the tool must oscillate in passing over the nose of the cam is very materially reduced, and the fact that the tool follows the point of the cam from above the horizontal plane, around the point and down below the horizontal plane, so far reduces the speed required in making the turn, and the jar of the bell crank lever roller upon the control cam, as to make a practical success of the Melling machine and avoid the features of disadvantage in the Gordon machine. Thus it is urged that the Gordon and Melling machines operate upon entirely different principles, the tool of Gordon tilting upon its cutting edge, while the tool of Melling oscillates upon a point remote from such cutting edge; the cutting edge of the tool of Gordon reciprocating substantially in a straight line, the edge of the Melling tool traveling in a marked orbit; and the lathe of Melling following the teachings especially of the Blanchard lathe, with the orbital movement of the tool of Brophy and Montreuil, while Gordon and Redlin take a step backward in the art by abandoning such orbital movement of the tool, except to an infinitesimal, theoretical degree.

The above-quoted claim unquestionably reads upon the defendant's machine, and if we go further, and compare the operative parts of the two machines, we find the same essential elements in both. As said by the Law Examiner in the Patent Office interference proceedings: "Each machine comprises, as its essential elements, a rotary work holder, a cutting tool, a tool-supporting member movable transversely to the work holder, a tool holder adjustably mounted on the tool-supporting member, work-shaping and tool-adjusting cams co-operating with the tool-supporting member and the tool holder, respectively, to vary the distance between the tool and the axis of the work holder, and to control the angular relation of the tool to the work, and means for rotating the work holder and the cams synchro-

nously. And in each machine the cam that moves the tool-supporting member towards and from the work holder is so shaped as to give the desired form to the work." To this definition of similarity of means might be added that in both we find the bell crank lever with its roller bearing as the means of transmitting the oscillatory movement from the control cam to the tool.

The fact that in Melling the tool-supporting member is apparently pivoted at a point remote from the cutting edge of the tool is immaterial in principle, since the point of pivot is controlled entirely by the size of the circular guide plate which is used. Convert such guide plate into a revolving pin of small dimensions, and the point of pivot would be brought substantially to the point of cut. The Melling machine would then be able to cut a design with hollow or dimple, which it cannot now do. The fact that the bell crank lever and control cam would then have to be redesigned, and the objection that the Melling machine would then be subject to the same disadvantages or defects as the Gordon machine, do not detract from the position that in principle the functions and the elements of the two machines are substantially the same. This is the more apparent when applied to the difference in the pattern cams used to control the line of cut. In the Melling machine the pattern is a replica of the finished work, and the spring tension impels the frame toward the work, holding the guide plate firmly against the pattern. In the complainant's machine the work and pattern cam are on opposite sides, respectively, of the tool and the roller member controlling the reciprocatory movement. The spring urges the frame away from the work, thus holding the bearing tightly against the pattern cam. In the complainant's machine, therefore, the pattern cam is not a replica, but substantially the reverse in shape, to the pattern of Melling. The principles, however, are identical.

Melling did not pattern his machine upon the Blanchard lathe, in so far as the tilting of the tool was concerned, for the principle of the Blanchard lathe contemplated only a revolving circular cutter head. The only suggestion drawn by Melling from the Blanchard lathe lay in the observation that in a design of that type the radius of the circular cutter at the point of cut was always perpendicular to the

tangent of the work—the ideal result—and that the arc of oscillation of the point of cut from above the horizontal plane, around the nose of the cam, and thence beneath such plane, was of much less degree than the arc of oscillation necessary in complainant's design. This observation did not solve the problem.

The principle of the Blanchard lathe produced reciprocating movement only, which was inoperative to cut with a single tool a nongeometric figure upon the revolving work, unless the tool were also given oscillating movement to maintain the normal angularity of the tool to the work. To produce this oscillation Melling turned to and appropriated the cam and bell crank lever construction of the complainant, thus producing the desired end by practically identical means used by Gordon. *Morley Machine Co. v. Lancaster*, 129 U. S. 263-281, 9 S. Ct. 299 (32 L. Ed. 715); *Cimiotti Unhairing Co. v. American Unhairing Machine Co.*, 115 F. 498-504 (C. C. A. 2); *Lourie Implement Co. v. Lenhart*, 130 F. 122, 129 (C. C. A. 8). This fact was suggested by the court below when the witness Melling was asked: "Well, didn't you get the suggestion of mounting the single cutter on an arm that in some way would rock, changing the relation of the cutter to the tangent of the work, from the Gordon and Redlin machine?" This question was not satisfactorily answered, and it is at least worthy of note that the means used bear such close functional and physical relationship to those employed by Gordon and Redlin, and that the organization involving their use did not occur to Melling until after he had inspected the complainant's machine in operation.

[6] As we have said, the elements of cam and bell crank lever to rock the tool, in combination with means for reciprocatory motion of the tool, constituted the essence of Gordon's inventive step. The patent is considered by us as a primary or generic one, and the claims are entitled to great liberality of construction. Doubtless the use of the Blanchard lathe principle to produce reciprocatory movement, the use of the circular guide plate of relatively large proportions, as compared with the work, and the resulting pivoting of the tool at a point substantially removed from its point, was a valuable improvement, which perhaps was patentable as such. But superiority of operation does not,

of necessity, negative infringement. *Schiebel Toy, etc., Co. v. Clark,* 217 F. 760, 771; *Toledo Mach. & Tool Co. v. E. W. Bliss Co.,* 287 F. 443, 447 (both C. C. A. 6). Applying the doctrine of broad equivalents properly applicable to generic patents, the variation between the conceptions of Gordon and Melling did not take the machines of Melling out of the domination of the claims awarded to Gordon and Redlin. *Hildreth v. Mastoras,* 257 U. S. 27, 36, 42 S. Ct. 20 (66 L. Ed. 112); *Temco Electric Motor Co. v. Apco Mfg. Co.,* 275 U. S. 319, 328, 48 S. Ct. 170 (72 L. Ed. 298); *Hoyt v. Horne,* 145 U. S. 302, 309, 12 S. Ct. 922 (36 L. Ed. 713); *Otto Coking Co. v. Koppers Co.,* 258 F. 122-135 (C. C. A. 3).

[7] Tersely expressed, our opinion is that Melling accomplished the same result as Gordon, perhaps more efficiently mechanically, but nevertheless by the employment of substantially the same means, or their equivalents, operating in substantially the same manner. This has universally been held to constitute infringement, and we so hold. *Union Paper Bag Machine Co. v. Murphy,* 97 U. S. 120, 24 L. Ed. 935; *Westinghouse v. Boyden Power Brake Co.,* 170 U. S. 537, 568, 569, 18 S. Ct. 707 (42 L. Ed. 1136); *Schiebel Toy & Novelty Co. v. Clark, supra; Allen v. Wingerter,* 17 F. (2d) 745, 747 (C. C. A. 3). Such decision is, of course, applicable to both defendant's cam cutting and crank shaft contour lathes, in both of which the patented combination of elements appears.

The judgment is reversed, so far as the finding of noninfringement is concerned, and the cause is remanded for further proceedings consistent with this opinion.

OPINION OF THE CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT IN GORDON FORM LATHE CO. v. FORD MOTOR CO., NOS. 7363, 7364, DECIDED JANUARY 12, 1937, 87 FED. (2d) 390.

1. Patents Key 328

Patent No. 1,542,803, for tool-moving and tilting mechanism in lathe, *held* valid and infringed as to claims 1, 2, 28 to 30, 33, 34, 39 to 42.

2. Patents Key 328

Patent No. 1,542,803, claims 29 and 30, for tool-moving and tilting mechanism in lathe whereby work piece was rotated many times with great rapidity in cutting operation, *held* not infringed by milling machine having multiple cutting points applied to slowly revolving work piece.

3. Patents Key 178

Inventor cannot, by mere use of word "means," appropriate any other mechanism or device than that described in patent or its mechanical equivalent.

Appeal and Cross-Appeal from the District Court of the United States for the Eastern District of Michigan; Arthur J. Tuttle, Judge.

Suit by the Gordon Form Lathe Company against the Ford Motor Company for the infringement of a patent. From an adverse decree defendant appeals, and plaintiff cross-appeals on account of a ruling on his application for accounting of property damages.

Modified and cause remanded.

Drury W. Cooper, of New York City (I. Joseph Farley and Bodman, Longley, Bogle, Middleton & Farley, all of Detroit, Mich., on the brief), for appellant and cross-appellee.

F. O. Richey, of Cleveland, Ohio (John W. Michael, of Milwaukee, Wis., F. M. Bosworth, of Cleveland, Ohio, Lecher, Michael, Whyte & Spohn, of Milwaukee, Wis., and Richey & Watts, of Cleveland, Ohio, on the brief), for appellee and cross-appellant.

Before Hicks and Simons, Circuit Judges, and Raymond, District Judge.

Raymond, District Judge.

The bill charged defendant,[1] Ford Motor Company, with infringing claims 1, 2, 12, 23, 24, 28 to 30, 33, 34, and

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[1] For brevity the parties are referred to herein as plaintiff and defendant as they were known in the court below.

38 to 42 of letters patent No. 1,542,803, issued June 16, 1925, to Gordon Form Lathe Company, upon application filed July 16, 1920, by Charles Gordon and Alfred W. Redlin. One of defendant's machines, known as the Walcott or Melling machine, was charged to infringe all of the claims enumerated, while another machine, known as the Pioch machine, was alleged to infringe claims 29 and 30. The defenses pleaded were invalidity and noninfringement. Defendant has appealed from the holding of the trial court that all of the claims involved were valid and that all were infringed by the Walcott machine, and that claims 29 and 30 were infringed by the Pioch machine. The cross-appeal relates to paragraph 5 of the decree which denies plaintiff's application for accounting of defendant's profits and of plaintiff's damages prior to June 13, 1929, and to paragraph 6, which denies application for increased damages under 35 U. S. C. §§ 67 and 70 (35 U. S. C. A. §§ 67, 70).

[1] Reference to prior litigation discloses the background of the present suit. The patent sued upon was involved in interference proceedings which terminated in the Court of Appeals of the District of Columbia, *Melling v. Gordon et al.*, 55 App. D. C. 278, 4 F. (2d) 945; in proceedings under Rev. St. § 4915 (35 U. S. C. A. § 63) to compel issuance of patent to plaintiff therein, *Melling v. Gordon Form Lathe Co.*, 14 F. (2d) 437 (D. C. Ohio); and in an appeal to this court, *Gordon Form Lathe Co. v. Walcott Mach. Co.*, 32 F. (2d) 55, which reviewed a decision of the District Court reported in 20 F. (2d) 673 (D. C. Mich.), which case on appeal determined the scope and validity of all the claims here involved excepting claims 12, 23, 24, and 38. These prior decisions render unnecessary detailed description of the Gordon and Walcott machines or restatement of the nature of the patent claims heretofore adjudicated. The Walcott machine here charged to infringe is the same as the one under consideration in the suit which was on appeal in this court. The principal issue relative thereto is whether the present record discloses additional prior art which so limits the scope of the patent claims in suit that the Walcott machine should now be held not to infringe.

For reasons similar to those indicated in the former opinion of this court, it is thought unnecessary to discuss claims 12, 23, 24 and 38.

Even brief discussion of all the asserted new prior art in the present record would unduly extend this opinion. Full consideration thereof brings conviction of its insufficiency to warrant modification of our previous conclusion that the patentees were pioneers in disclosing means for oscillating the tool in synchronism with its reciprocatory movements and the revolution of the work by the use of an appropriately shaped cam, moveable frame, and bell crank lever tool support for use in cutting nongeometric forms and that the Walcott machine is an infringement. Upon the present record, the Blanchard lathe and the Westinghouse machine are most relied upon. The first was fully discussed in our opinion in the former case, and it suffices to say that in the view of the court there is still nothing to justify interpretation of that patent as disclosing a tool which is tilted to maintain it in proper cutting position during the cutting of a nongeometric form. The Westinghouse machine relied upon was built and used in 1910. Westinghouse did not tilt the tool to maintain it in proper cutting position relative to the work. The record is clear that the product of the machine was far from perfect and that, notwithstanding the demand for a cam turning machine, its use was abandoned after cutting a comparatively small number of shafts.

The decree of the lower court relating to the Walcott machine is affirmed so far as it relates to findings of validity and infringement of all claims relied upon excepting claims 12, 23, 24, and 38.

[2, 3] The Pioch machine alleged to infringe claims 29 and 30 has not been before this court. It was designed in 1929 by an employee of defendant soon after the decision of this court holding the Walcott machine to infringe. Its use was to cut the pear shaped cams which are a part of the camshaft and which raise and lower the valves of the cylinders of an automobile engine. Because of the sharper points of the cams as they had for many years been used in defendant's engine, plaintiff was unable with its machine, after efforts extending over many months, to accomplish more than a very moderate degree of success. Due to the necessary rapid change of position of the tool relative to the work piece as the tool passed from the lower to the upper side of the pointed end of the cam, a cut or gouge was

frequently left on the lower side of the completed cam and an excess of material upon the upper side which resulted in a very considerable percentage of rejection, rendering it of dubious practical value in defendant's plant. Because of this inefficiency the Gordon machine was rejected by defendant after a long period of experimentation and the Walcott machine was substituted. Defendant used the Walcott machine until the decision of this court already referred to, whereupon the Pioch machine was developed and substituted. The issue involved in this branch of the case is whether the Pioch machine appropriated the mechanical principles disclosed by claims 29 and 30. They read:

"29. In a structure of the class described, the combination of a tool support, a tool mounted on said support for swinging movement, a pattern cam corresponding to the shape of the cam to be cut for controlling said support, and means for swinging said tool whereby its cutting position relative to the work is maintained as the work revolves.

"30. In a structure of the class described, the combination of a tool support, a tool mounted on said support for swinging movement, a pattern cam for the cam to be cut, said pattern cam being adapted to control said support, and means for swinging said tool in such wise as to maintain the same in proper cutting position relative to the work as the latter revolves."

In the *Gordon Form Lathe Company* suit, 32 F. (2d) 55, 58, this court stated "the precise inventive step of Gordon and Redlin would seem to lie in combining with the means for producing reciprocatory movement of the tool, old in the art, the means for controlling the oscillatory movement of such tool by a separate and specially designed cam, spring, and bell crank lever, in such organization that the means for both reciprocatory and oscillating movement, working in synchronism with each other and with the rotation of the work, could cut a cam, crank cheek, or other non-geometric form."

Whatever novelty exists in the combination of elements set forth in the claims relied upon resides in the "means" clause described as the last element of each claim, and this, under well-settled authority, must be limited to the element

in the combination as expressed in the specifications. An inventor cannot by the mere use of the word "means" appropriate any and all kinds of mechanism or devices which may perform the specified function, or any other mechanism or device than that which is described in the patent or which is its mechanical equivalent. See *Bettendorf Co. v. Ohio Steel Foundry Co.*, 56 F. (2d) 777 (C. C. A. 6); *Davis Sewing Machine Co. v. New Departure Mfg. Co.*, 217 F. 775, 782 (C. C. A. 6); *Portland Gold Mining Co. v. Hermann*, 160 F. 91, 99 (C. C. A. 8); *R. M. Hollingshead Co. v. Bassick Mfg. Co.*, 73 F. (2d) 543 (C. C. A. 6).

The Pioch machine is a milling machine and not a lathe as in Walcott. The cutting action results from the rotation of a milling cutter having twelve sharp edges or cutting teeth. The cutter is rotated with great rapidity during the milling operation. The work piece makes but a single revolution during the entire cutting operation, which consumes approximately forty seconds. The cutter is secured to the end of a shaft which is rotated by means of gears. This shaft is mounted for rotation in a tool carrying head mounted in a housing for reciprocal up and down movement. The housing is pivoted upon a shaft. The entire housing is swung across the contour of the work piece by the joint action of a cam groove formed in the side face of a cam and a roller which projects laterally from a projecting arm of the housing. Movement of the cutter towards and away from the axis of rotation of the work piece is under the control of the peripheral face of the cam, while the up and down motion of the cutter is controlled by a lever which at one end is provided with a roller that engages with the peripheral face of a cam. The twelve teeth on the cutter remain in substantially the same plane throughout the cutting operation. These teeth are built solidly into the cutting tool and there is no movement which changes their cutting position relative to the work, the only apparent exception being a sidewise motion which is given to the tool to cause it to cut the entire width of the work piece. There is no substantial difference in the angle at which any of the cutting edges of the teeth contact with the work piece. The slight tilting of the tool which results from the swinging of the tool head is on an arc of such radius that it produces no material effect on the cutting action of the

tool. It is apparent from the record and the design of the machine itself that the swinging motion is not for the purpose of maintaining the tool in "proper cutting position relative to the work as the latter revolves," within the meaning of the claims being considered. The slight tilting in the Pioch machine is not comparable to the tilt of the Gordon tool, which has for its sole purpose the maintenance of the tool in proper cutting position relative to the work. The cutting edges of the milling tool of Pioch remain fixed relative to the axis of rotation thereof. The swinging action is not of any effect whatsoever on changing the angle of the teeth of the milling cutter to the work presented to it, but is for the purpose of causing the narrower tool (necessitated by the number of cams to be cut simultaneously) to traverse the entire surface of the work to remove excess stock.

The record establishes that, while the Gordon machine was designed to cut cams and other nongeometric forms, it did not and could not, upon a sharp pointed cam, swing the cutting tool with sufficient speed and precision to maintain it in proper cutting position on the portions immediately above and below the point, nor could it be so reorganized as to accomplish the result while using a single cutting tool which tilted upon its point upon a rapidly revolving work piece. Pioch, by substitution of a milling cutter with multiple cutting points applied to a slowly revolving work piece, accomplished the desired result during one revolution of the work piece. The court is unable to find mechanical equivalency with Gordon in this operation. It appears from the record that, had it not been for the closeness of the cams on the camshaft of the Ford engines that were being produced when the Pioch machine was designed, a larger milling cutter could have been employed which would have rendered unnecessary any movement of the tool other than vertical. The Gordon machine is a lathe with a single point tool which cuts a narrow shaving at each rotation of the work, the work piece being rotated many times with great rapidity before the work is completed.

To accord to claims 29 and 30 the broad interpretation of the word "means" necessary to include the Pioch machine would be to grant a monopoly upon the functions of

the Gordon machine and would preclude not only every conceivable combination which would produce the results accomplished by it but also results not possible of accomplishment thereby. No infringement of claims 29 and 30 by the Pioch machine appears and the decree below should be modified accordingly.

Concerning the cross-appeal which challenges paragraphs 5 and 6 of the decree, it is our view, upon the authority of *Wine Railway Appliance Co. v. Enterprise Railway Equipment Co.*, 297 U. S. 387, 56 S. Ct. 528, 80 L. Ed. 736, and because of the apparent incompleteness of the record upon the issues involved, that all questions relating to the accounting should be postponed until after the return of the master's report. These paragraphs should therefore be stricken from the interlocutory decree appealed from.

The case will be remanded for further proceedings in conformity with this opinion. No costs will be awarded on this appeal.

FINAL JUDGMENT.

(Entered April 29, 1941 by Arthur J. Tuttle, Judge.)

This cause having been heard by this Court, and upon consideration thereof and upon arguments and briefs of counsel, and interlocutory decree of this Court entered thereon on the 20th day of November, 1934, and appeal of defendant and cross-appeal of plaintiff having been allowed to the Circuit Court of Appeals for the Sixth Circuit from said decree, and such appeals having been heard and disposed of, and said Circuit Court of Appeals having ordered and decreed that the said decree of this Court in this cause be modified and the cause remanded for further proceedings in conformity with the opinion of the Circuit Court of Appeals given January 12, 1937, and the further opinion and ruling of said Court given and entered June 4, 1937, and the mandate of said Court, issued February 19, 1937, having been recalled and amended, and this cause having been remanded to this Court on said amended mandate,

and referred to Donald L. Quaife, Esq., as Special Master, to take and report an account of the profits, gains and advantages which the defendant has derived, received, earned or saved by reason of defendant's infringement of said Letters Patent No. 1,542,803, and to compute and report a reasonable royalty for defendant's use of the invention of said Letters Patent, and to take evidence and report on the question of increase of damages, and the said Donald L. Quaife, Esq., having, pursuant to such reference, taken evidence upon such matters and made and filed with this Court his report thereon, and this cause having come on to be heard upon said report and upon the objections thereto filed on the part of plaintiff and defendant upon the motion of plaintiff duly made and entered herein, and said cause having been argued by counsel for the respective parties, and the Court having considered the written report of the Master made and filed herein, the arguments of counsel with respect to the objections thereto respectively taken and the briefs of counsel filed herein on said objections, and being fully advised in the premises, it is

ORDERED, ADJUDGED AND DECREED:

1. That the Decree on Mandate of this Court entered herein on or about the 28th day of June, 1937, be and the same is hereby vacated in favor of this decree which is substituted and entered in place thereof.

2. That Letters Patent of the United States to Charles Gordon and Alfred W. Redlin No. 1,542,803, issued June 16, 1925, for Lathe is good and valid in law as to Claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42; that the inventors, Charles Gordon and Alfred W. Redlin, named in the patent were the first, true, original and joint inventors of the inventions, improvements and combinations described therein; and that the plaintiff, The Gordon Form Lathe Company, is the lawful owner of the entire right, title and interest in and to said inventions, improvements and combinations and in and to said Letters Patent therefor, as aforesaid, and has full standing in equity with respect to the issues involved in this suit.

3. That defendant, Ford Motor Company, has infringed the United States Letters Patent No. 1,542,803 to Gordon and Redlin and Claims 1, 2, 28, 29, 30, 33, 34, 39,

40, 41 and 42 thereof and has violated the exclusive rights of the plaintiff thereunder by the use of machines known in this record as the Melling or Walcott machine and illustrated in Exhibit 21 (drawings of the Melling machine marked B-1, B-2, B-3 and B-4).

4. That defendant, Ford Motor Company, has not infringed the United States Letters Patent No. 1,542,803 to Gordon and Redlin and Claims 29 and 30 of said Gordon and Redlin patent by the manufacture and use of machines known as the Pioch machine illustrated in Plaintiff's Exhibits 23, 24, 25, 44 and 114.

5. That a Writ of Injunction issue out of and under the seal of this Court directed to the said defendant, Ford Motor Company, its officers, agents, attorneys, employees, associates and privies enjoining and restraining it and them and each of them, from directly or indirectly infringing any of the claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42 of said Letters Patent and particularly from making or selling or using any machines like those illustrated in Exhibit 21 (drawings of the Melling machine marked B-1, B-2, B-3 and B-4), or any apparatus or devices covered by or containing or embodying any of the inventions defined in any of said claims, and from offering or advertising so to do, and from aiding or abetting others or in any way contributing to the infringement of any of said Claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42 of said Letters Patent.

6. That the bill of complaint is dismissed without prejudice as to Claims 12, 23, 24 and 38.

7. That the report of the Special Master is adopted in each and every respect excepting only as to that part thereof which allows and awards plaintiff the sum of $120,625.89 as savings on overhead, and as to such overhead savings his report is modified by striking such saving therefrom.

8. That all of the objections of plaintiff are overruled and all of the objections of defendant are overruled except objection No. 13 which is allowed.

9. That the plaintiff recover from the defendant, Ford Motor Company, the profits which it has derived, received, earned or saved by reason of defendant's infringement of said Letters Patent No. 1,542,803 in the amount of

$86,198.33; or, at plaintiff's election, the general damages which plaintiff has sustained by reason of defendant's infringement of said Letters Patent in the amount of $120,000.00, said sum of $120,000.00 having been found by the Master to be a reasonable royalty for defendant's use of the invention of plaintiff's Letters Patent.

10. That the plaintiff recover from defendant interest on said profits in the amount of $661.25, or if it elects to take general damages then interest on said general damages in the amount of $920.56, said interest being computed at the rate of five percent (5%) per annum from March 3, 1941, the date of the filing of the Master's report herein, to the date hereof.

11. That this decree shall carry interest on the amount thereof until the same is paid at the rate of five percent (5%) per annum.

12. That the plaintiff recover from defendant its costs incurred in this case subsequent to June 28, 1937, the same to be taxed.

13. That execution be issued for collection of the aforesaid profits or damages, interest and costs.

ARTHUR J. TUTTLE, (signed)
United States District Judge.

Detroit, Michigan,
April 29, 1941.

Approved as to form:

GEORGE REX FRYE, (signed)
SWAN, FRYE & HARDESTY, (signed)
Of Counsel for Plaintiff.

I. JOSEPH FARLEY, (signed)
BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY, (signed)
Counsel for Defendant.

NOTICE OF APPEAL OF PLAINTIFF.

(Filed April 30, 1941.)

NOTICE IS HEREBY GIVEN that THE GORDON FORM LATHE COMPANY, a corporation, plaintiff above named, hereby appeals to the Circuit Court of Appeals for the Sixth Circuit from those portions of the Final Judgment entered herein on or about April 29, 1941, as follows:—

(1) From paragraph 7 of the decree—

"That the report of the Special Master is adopted in each and every respect excepting only as to that part thereof which allows and awards plaintiff the sum of $120,625.89 as savings on overhead, and as to such overhead savings his report is modified by striking such saving therefrom."

(2) From paragraph 8 of the decree—

"That all of the objections of plaintiff are overruled and * * * objection 13 (of defendant) * * * is allowed."

(3) From paragraph 9 of the decree—

"That the plaintiff recover from the defendant, Ford Motor Company, the profits which it has derived, received, earned or saved by reason of defendant's infringement of said Letters Patent No. 1,542,803 in the amount of $86,198.33; or, at plaintiff's election, the general damages which plaintiff has sustained by reason of defendant's infringement of said Letters Patent in the amount of $120,000.00, said sum of $120,000.00 having been found by the Master to be a reasonable royalty for defendant's use of the invention of plaintiff's Letters Patent."

(4) From paragraph 10 of the decree—

"That the plaintiff recover from defendant interest on said profits in the amount of $661.25, or if it elects to take general damages then interest on said general damages in the amount of $920.56, said interest being computed at the rate of five percent (5%) per annum from March 3, 1941, the date of the filing of the Master's report herein, to the date hereof."

B. D. WATTS,
RICHEY & WATTS,
Of Counsel for Plaintiff.

GEORGE REX FRYE,
Solicitor for Plaintiff.

Dated: April 30, 1941.

BOND ON APPEAL OF PLAINTIFF.

(Filed April 30, 1941.)

KNOW ALL MEN BY THESE PRESENTS That we, The Gordon Form Lathe Company, a Corporation of Ohio, as principal, and Fidelity & Deposit Company of Maryland, a Corporation organized and existing under the laws of the State of Maryland and authorized to do business within the State of Michigan, as Surety, are held and firmly bound unto Ford Motor Company, a Corporation of Delaware, in the full and just sum of Two Hundred and Fifty Dollars ($250.00) for the payment of which well and truly to be made, we bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated this 30th day of April, 1941.

WHEREAS, lately, at a session of the District Court of the United States for the Eastern District of Michigan, Southern Division, in the above entitled cause pending in said Court between the said The Gordon Form Lathe Company, Plaintiff, and Ford Motor Company, Defendant, final judgment was rendered in favor of Plaintiff but which in part denied Plaintiff certain recoveries, and the said Plaintiff is about to file a notice of appeal to the United States Circuit Court of Appeals for the Sixth Circuit.

Now, the condition of the above obligation is such that if the said The Gordon Form Lathe Company shall answer all costs if it fails to make good its appeal, then the above obligation to be void, otherwise to remain in full force and virtue.

THE GORDON FORM LATHE COMPANY,
By CHAS. GORDON, (Seal)
President.

FIDELITY & DEPOSIT COMPANY OF MARYLAND,
By E. J. HAMMEL, (Seal)
Attorney-in-Fact.

Taken and Approved this 30th day of April, 1941.

ARTHUR J. TUTTLE,
United States District Judge.

PLAINTIFF'S STATEMENT OF POINTS TO BE URGED ON APPEAL.

(Filed April 30, 1941.)

Now Comes The Gordon Form Lathe Company, a Corporation, plaintiff in the above entitled cause, and in pursuance of and obedience to the Rules of Civil Procedure for the District Courts of the United States and the Rules of the United States Circuit Court of Appeals for the Sixth Circuit, in such cases made and provided, sets out the following statement of points on which it intends to rely on its appeal from the decree entered on or about the 29 day of April, 1941, in said cause:

1. The Landis grinder is the only acceptable standard of comparison for measuring defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts.

2. The cases cited in the Master's report in support of his adoption of a modified shaper as the proper standard of comparison in measuring defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts, do not support the adoption of such standard in this case.

3. Under applicable law neither the Ford cam shaper nor any modification thereof may be regarded as a proper standard of comparison for measuring defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts.

4. In the alternative and without prejudice to any of the foregoing, the double shaper method (two Ford cam shapers to machine each shaft) is the only proper standard of comparison for measuring the defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its Model A production, if under applicable law the Ford cam shaper may be regarded at all as a proper standard of comparison.

5. Plaintiff is entitled to recover the savings, gains and advantages in overhead or burden realized by defend-

ant in the use of the infringing Melling or Walcott machines.

6. The general damages which plaintiff sustained by reason of defendant's infringement of said Letters Patent as a reasonable royalty is wholly inadequate.

THE GORDON FORM LATHE COMPANY,
RICHEY & WATTS,
By B. D. WATTS,
Of Counsel.

GEORGE REX FRYE,
Solicitor for Plaintiff.

Dated: April 30, 1941.

NOTICE OF APPEAL OF DEFENDANT.

(Filed July 2, 1941.)

NOTICE IS HEREBY GIVEN that FORD MOTOR COMPANY, a corporation defendant above named, hereby appeals to the Circuit Court of Appeals for the Sixth Circuit from those portions of the Final Judgment entered in this action on April 29th, 1941, as follows:

1. From so much of paragraph (7) of the Final Judgment reading as follows:

> That the report of the Special Master is adopted in each and every respect * * *.

2. From so much of paragraph (8) of the Final Judgment reading as follows:

> That * * * all the objections of the defendant are overruled * * *.

3. From paragraph (9) of the Final Judgment reading as follows:

> That the plaintiff recover from the defendant, Ford Motor Company, the profits which it has derived, received, earned or saved by reason of defendant's infringement of said Letters Patent No. 1,542,803 in the amount of $86,198.33; or, at plaintiff's election, the general damages which plaintiff has sustained by reason of defendant's infringement of said Letters Patent in the amount of $120,000.00, said sum of $120,000.00 having been found by the Master to be a reasonable royalty for defendant's use of the invention of plaintiff's Letters Patent.

4. From paragraph (10) of the Final Judgment reading as follows:

> That the plaintiff recover from defendant interest on said profits in the amount of $661.25, or if it elects to take general damages then interest on said general damages in the amount of $920.56, said interest being computed at the rate of five percent (5%) per annum from March 3, 1941, the date of the filing of the Master's report herein, to the date hereof.

5. From paragraph (11) of the Final Judgment reading as follows:

That this decree shall carry interest on the amount thereof until the same is paid at the rate of five percent (5%) per annum.

6. From paragraph (12) of the Final Judgment reading as follows:

That the plaintiff recover from defendant its costs incurred in this case subsequent to June 28, 1937, the same to be taxed.

7. From paragraph (13) of the Final Judgment reading as follows:

That execution be issued for collection of the aforesaid profits or damages, interest and costs.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY.

Jul 2 1941.

Service of a copy of the foregoing NOTICE OF APPEAL is acknowledged this 2d day of July, 1941.

GEORGE REX FRYE (sgd),
Counsel for Plff.

BOND ON APPEAL OF DEFENDANT.

(Filed July 2, 1941.)

KNOW ALL MEN BY THESE PRESENTS That we, Ford Motor Company, a Corporation of Delaware, as principal, and American Employers' Insurance Company of Massachusetts, a Corporation organized and existing under the laws of the State of Massachusetts and authorized to do business within the State of Michigan as Surety, are held and firmly bound unto The Gordon Form Lathe Company, a Corporation of Ohio, in the full and just sum of Two Hundred and Fifty Dollars ($250.00) for the payment of which well and truly to be made, we bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated this 2nd day of July, 1941.

WHEREAS, lately, at a session of the District Court of the United States for the Eastern District of Michigan, Southern Division, in the above entitled cause pending in said Court between the said The Gordon Form Lathe Company, Plaintiff, and Ford Motor Company, Defendant, final judgment was rendered in favor of Plaintiff but which in part denied Defendant certain relief, and the said Defendant is about to file a notice of appeal to the United States Circuit Court of Appeals for the Sixth Circuit.

Now, the condition of the above obligation is such that if the said Ford Motor Company shall answer all costs if it fails to make good its appeal, then the above obligation to be void, otherwise to remain in full force and effect.

FORD MOTOR COMPANY,
By B. J. CRAIG. (Sgd.)

AMERICAN EMPLOYERS' INSURANCE COMPANY,
By F. J. HAGEN. (Sgd.)

Taken and approved this 2 day of July, 1941.

ARTHUR J. TUTTLE (Sgd.),
United States District Judge.

Service of a copy of the foregoing BOND is acknowledged this 2nd day of July, 1941.

GEORGE REX FRYE (Sgd.)
Counsel for Plff.

DEFENDANT'S STATEMENT OF POINTS TO BE RELIED ON UPON APPEAL UNDER RULE 75 (d) OF RULES OF CIVIL PROCEDURE.

(Filed July 2, 1941.)

(1) The burden was on plaintiff to prove both damages and profits from the use, as a part of the Walcott machine held to infringe, of the tilting tool, and plaintiff did not sustain it.

(2) The Court erred in holding that plaintiff is entitled to all of defendant's profits, in the face of the determination by the Court of Appeals that the machine of the patent in suit was not usable by defendant for cutting its cam shafts, and in the face of the uncontradicted testimony that the infringing machines were usable by defendant only by reason of the inclusion therein of additional patented improvements covered by the Melling patents, Exhibits 209 and 312.

(3) The Court erred in holding that plaintiff is entitled to all the profits in face of uncontroverted evidence that such profits resulted from inventions other than those of the patent in suit and plaintiff failed to meet its burden of proof by offering any evidence on the subject of apportionment.

(4) The Court should have held that the use of the essential element of the patent in suit, to-wit, a tilting tool, was not necessary to the functioning of the infringing machines, since the uncontroverted testimony is that such machines would perform their function at least as well when provided with non-tilting tools.

(5) The Court erred in holding that the modified Walcott or Melling machine, with a non-tilting tool, is not a proper standard of comparison.

(6) The defendant's cam shaft shaper, having been accepted as a proper standard of comparison for the machining of defendant's Model T and Model A cam shafts, should also have been held a proper standard of comparison for the defendant's Model F tractor cam shaft.

(7) The Court should have allowed to defendant the cost of the added straightening operation employed by defendant in using the infringing machines in the computa-

tion of alleged profits from such use; such operation having been actually employed there, but not when using the shapers which constituted the accepted standard of comparison.

(8) The Court should not have calculated an eighteen per cent (18%) reduction in the output of shafts per hour in the use of the Ford cam shaper for machining Model A cam shafts, since that is contrary to the uncontroverted testimony on the accounting.

(9) The Court should not have accepted the computation of costs for rough grinding Model F tractor cam shafts based upon an assumed life of a grinding wheel for grinding only fifty cam shafts; whereas on the accounting the plaintiff accepted fifty-five hours' life, for the grinding of 440 cam shafts.

(10) The plaintiff having manufactured and sold the machine of the patent in suit and licensed others so to do and having stood idly by and quiescent with full knowledge of defendant's use of the infringing machines, the accounting period should date from June 13, 1929, the date of plaintiff's first actual and sufficient notice to defendant, and not from June 16, 1925, the date of issuance of the patent in suit.

(11) There is no basis for the acceptance of the sum of Five Thousand Dollars ($5,000.00) per machine as a reasonable royalty, in the absence of supporting evidence and in the face of the patentee's acceptance of ten per cent (10%) of the sales price as a royalty for the use of the patented invention on all machines actually sold by plaintiff.

(12) The Court should not have accepted the sum of Five Thousand Dollars ($5,000.00) per machine as a reasonable royalty, utilizing contracts in settlement for past infringement as a means for arriving at such figure.

(13) There is no basis for any award except of nominal damages, in view of the fact that plaintiff effected a settlement with Walcott Machine Tool Company, the manufacturer of defendant's infringing machine, and from which defendant purchased such machines under a guarantee of which the plaintiff had full notice at the time of making such settlement.

(14) There should be no recovery to plaintiff except of nominal damages, because plaintiff offered no evidence to establish damage and defendant has not been shown to have earned any profits from the use of that single element in the machine which is covered by the patent in suit.

FORD MOTOR COMPANY,

By BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY.

July 2, 1941.

Service of a copy of the foregoing DEFENDANT'S STATEMENT OF POINTS TO BE RELIED ON UPON APPEAL UNDER RULE 75(d) OF RULES OF CIVIL PROCEDURE is acknowledged this 2nd day of July, 1941.

GEORGE REX FRYE (sgd.),
Of Counsel for Plaintiff.

STIPULATION RE WAIVER OF SUPERSEDEAS BOND.

(Dated June 27, 1941.)

IT IS HEREBY STIPULATED by and between counsel for the respective parties, that the filing of a Supersedeas Bond by defendant is waived.

RICHEY & WATTS,
Counsel for Plaintiff.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Counsel for Defendant.

Dated: June 27, 1941.

STIPULATION CONCERNING NUMBER OF COPIES OF RECORD TO BE FILED ON APPEAL.

(Dated July 19, 1941.)

IT IS HEREBY STIPULATED, by and between the parties hereto, through their respective counsel, this Honorable Court consenting, that because the record in this case is quite voluminous and for the purpose of reducing the cost of the printed record, that the parties' exhibits be filed in books separate from the testimony and other pleadings and papers in this cause and that the following number of copies of each set of books be filed herein:

25 copies of the testimony, pleadings and other papers.
10 copies of the parties' exhibits.

LECHER, MICHAEL, WHYTE & SPOHN,
Counsel for Plaintiff.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Counsel for Defendant.

Dated: July 19, 1941.

STIPULATION RE EXHIBITS AND TRANSCRIPT OF RECORD ON APPEAL IN GORDON v. FORD NOS. 7363-4.

(Dated July 21, 1941.)

IT IS HEREBY STIPULATED AND AGREED by and between the parties hereto, through their respective counsel:

1. That the consolidated printed transcript of record on appeal and cross-appeal (Vol. I, pages 1-466, and Vol. II, pages 467-957) in the case of Ford Motor Company, Appellant and Cross-Appellee, vs. Gordon Form Lathe Company, Appellee and Cross-Appellant, Nos. 7363-4, in the United States Circuit Court of Appeals for the Sixth Circuit, shall be considered as and constitute a joint exhibit herein, and that three (3) copies of said record shall be transmitted to the United States Circuit Court of Appeals for the Sixth Circuit along with the printed transcript of record on appeal herein; and

2. That all of the other exhibits herein, both plaintiff's and defendant's, and all of the exhibits referred to in the printed transcript of record identified in paragraph 1 hereof, excepting those included and listed in the stipulated designation of contents of plaintiff-defendant composite record on appeal herein, may, with the consent of the Court, all be considered and certified as physical exhibits to be retained in the custody of counsel subject to inspection at all reasonable times by opposing counsel and to be produced at all arguments and proceedings of the United States Circuit Court of Appeals for the Sixth Circuit in connection with the appeals heretofore filed herein.

(sgd) LECHER, MICHAEL, WHYTE & SPOHN,
Counsel for Plaintiff.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Counsel for Defendant.

Dated: July 21, 1941.

ORDER RE EXHIBITS AND TRANSCRIPT OF RECORD ON APPEAL IN GORDON v. FORD NOS. 7363-4.

(Entered July 23, 1941 by Arthur J. Tuttle, Judge.)

Pursuant to stipulation filed herein, IT IS ORDERED:

1. That the record on the appeal of plaintiff and the record on the appeal of defendant from the Judgment of this Court which was signed and entered on the 29th day of April, 1941, shall be consolidated in one transcript of record.

2. That the consolidated printed transcript of record on appeal and cross-appeal (Vol. I, pages 1-466, and Vol. II, pages 467-957) in the case of Ford Motor Company, Appellant and Cross-Appellee, vs. Gordon Form Lathe Company, Appellee and Cross-Appellant, Nos. 7363-4, in the United States Circuit Court of Appeals for the Sixth Circuit, shall be considered as and constitute a joint exhibit herein, and that three (3) copies of said record shall be transmitted to the United States Circuit Court of Appeals for the Sixth Circuit along with the printed transcript of record on appeal herein.

3. That all of the other exhibits herein, both plaintiff's and defendant's, and all of the exhibits referred to in the printed transcript of record identified in paragraph 2 hereof, excepting those included and listed in the stipulated designation of contents of plaintiff-defendant composite record on appeal herein, may, with the consent of the Court, all be considered and certified as physical exhibits to be retained in the custody of counsel subject to inspection at all reasonable times by opposing counsel and to be produced at all arguments and proceedings of the United States Circuit Court of Appeals for the Sixth Circuit in connection with the appeals heretofore filed herein.

4. That said exhibits shall be certified to the United States Circuit Court of Appeals for the Sixth Circuit as physical exhibits in connection with the appeals of the parties to this suit for use on all arguments and proceedings in connection with said appeals, and that they shall be returned to this Court after the decision of the cause on said appeals unless otherwise ordered by the Circuit Court of Appeals.

TUTTLE,
United States District Judge.

Dated: July 23, 1941.

STIPULATED DESIGNATION OF CONTENTS OF PLAINTIFF-DEFENDANT COMPOSITE RECORD ON APPEAL.

(Dated September 4, 1941.)

To the Clerk of the above-named Court:

SIR:

In the above entitled cause please prepare, certify and transmit to the Circuit Court of Appeals for the Sixth Circuit, pursuant to the notice of appeal heretofore filed herein, and pursuant to stipulation of the parties, the following designated portions of the record, proceedings and evidence, to be contained in and to constitute the record on appeal:

1. Decree on Mandate dated June 28, 1937.
2. Master's report.
3. Clerk's notice dated March 3, 1941, of the filing of the Master's report.
4. Plaintiff's objections thereto.
5. Defendant's objections thereto.
6. Motion for action upon Master's report and objections thereto, together with affidavit of Todd L. Moise and exhibits filed therewith.
7. Notice of Motion.
8. Opinion of the Hon. Arthur J. Tuttle, District Judge, on the objections to the Master's report.
9. The following portions of the pleadings, evidence and proceedings had upon the accounting before the Master:

(a) "MASTER'S ORDER FOR STATEMENT OF ACCOUNT" July 6, 1937. Paragraphs 1 and 2, 15, 16, 17, 19, 20, 25, 26, 27, 28, 30, 31, 32, 34 to 40 inc., 42 to 44 inc., 45, 49, 47, 50, all of 53.

(b) EXHIBIT A—DEFENDANT'S STATEMENT OF ACCOUNT—including Exhibits 7, 10, 11 and 12, attached to Exhibit A. Answers to numbered paragraphs above tabulated.

(c) EXHIBIT B—AMENDMENT TO DEFENDANT'S STATEMENT OF ACCOUNT. Paragraphs 2, 27, 30, 34, 44, 45, 53(6).

(Ptf. Rec. Vol. III beginning line 18, page 29.)

(d) Mr. Spohn: Now, if your Honor please, as Mr. Watts has pointed out, the statements of account filed by the defendant in this case under the rule are pleadings. There are three statements of account and they have been designated for purposes of identification for cross examination as Exhibits A, B, and C. Exhibit A being the first statement of account, and B being an amended statement of account, and Exhibit C being defendant's further statement of account.

These statements of account, as I say, are pleadings. Plaintiff admits some of the facts therein stated and denies others, and of course as to those denied puts defendant to its proof, and it is my purpose now to advise the Court and counsel for defendant what portions of these three accounts are admitted by the plaintiff and what portions of these accounts are denied, and when I say "admitted" may that be understood as accepted by the plaintiff, and when I say "denied" may it be understood as meaning rejected by the plaintiff, and I am going to go through this slowly. There are 53 questions involved in the first account, the answers to which in some instances were amended, in the amended account.

Question No. 1 is admitted. The answer is admitted.

Question No. 2, the answer as amended, is admitted.

Question No. 15, plaintiff admits the first sentence of the answer and denies the balance of the answer to that question.

Question No. 16, plaintiff admits the answer.

Question No. 17, plaintiff admits the answer.

Question No. 19, plaintiff admits the answer.

Question No. 20, plaintiff admits the first paragraph of the answer and rejects all the material in the second paragraph of the answer, that material following the words, "is attached hereto and marked Exhibit 6."

Question No. 25, plaintiff admits the answer.

Question No. 26, plaintiff admits the answer.

Question No. 27, plaintiff admits the amended answer, excepting only that portion thereof reading as follows, which portion of the answer plaintiff denies:

"No permanent actual cost records were kept by defendant with respect to the cost of machining the cams of the model T cam shaft on the cam shaft shapers, defendant's accounting practice in this respect being fully described in paragraph 20 hereof to which reference is here made. The cost of machining the model T cam shafts, T-410, has been compiled from such records as are available and is annexed hereto and marked Exhibit 9."

Question No. 28, plaintiff admits the answer.

Question No. 30, plaintiff denies both the original answer and the amendment to the answer.

Question No. 31, plaintiff admits the answer.

Question No. 32, plaintiff admits the answer.

Question No. 34, plaintiff admits defendant's original answer to question 34 and denies the amended answer.

Question No. 35, plaintiff admits the answer excepting the following portion of the answer which plaintiff denies: "(a) A Gordon lathe as disclosed in Plaintiff's Exhibit 2, Patent No. 1,542,803 to Charles Gordon and Alfred W. Redlin."

Question No. 36, plaintiff denies the answer.

Questions 37, 38, 39, 40, 42, 43, plaintiff denies defendant's answer.

Question 44, plaintiff denies the defendant's answer in its original statement of account and also as amended.

Question No. 45, plaintiff admits defendant's amended answer, excepting only computation of costs and elements of costs as designated by defendant on Exhibit 12 therein referred to.

Question No. 47, plaintiff accepts defendant's answer.

Question No. 49, plaintiff denies the answer.

Question No. 50, plaintiff admits the answer.

Question 53, plaintiff accepts the answer and admits the same, but denies the basis and methods therein set forth.

(e) Master's "Order for Statement of Account" Dated October 29, 1937. Paragraphs 1 to 5 inclusive, 8, 9, 10.

DEFENDANT'S FURTHER STATEMENT OF ACCOUNT.

(f) Pages 1-7, Exhibit C.
Pages 8 and 9, Exhibit C[1].
Pages 10, 11, and 12, Exhibit C.
Page 17, Exhibit C[1], except last two lines referring to Westinghouse.
Page 18, Exhibit C, Paragraph 2A, first paragraph of paragraph 2B.
Page 18, Exhibit C, Paragraph 2c to "comparison" in line 4 thereof, inserting period after "comparison" and canceling remainder of this paragraph.
Page 18, Exhibit C, Paragraph 3.
Page 18, Exhibit C, Paragraph 4, first sentence.
Page 19, Exhibit C, all of page except lines 1 to 6, and line 7 to period.
Pages 20, 21, 22, Exhibit C.
Pages 23 and 24, Exhibit C[1].
Pages 25 and 26, Exhibit C.
Pages 30, 31, Exhibit C.

(Ptf. Rec. Vol. III from page 34, line 26 to page 37, line 3 inclusive.)

(g) Mr. Spohn: Now with respect to the defendant's further statement of account which has been identified for the purposes of cross examination as Exhibit C, the plaintiff denies all the material in paragraph 1, page 1, denies all the material on schedule 1, sheet 1, and the whole page. Denies all of the material on schedule 1, sheet 2, page 3. Denies all of the material on sheet 3 of schedule 1, page 4, of the report. Denies all of the material on sheet 4 of schedule 1, page 5, of the report. Denies all of the material, sheet 5, schedule 1, page 6. Denies all of the material on sheet 6, schedule 1, page 7. Denies all of the material on sheet 1, schedule 2, page 8. Denies all of the material, sheet 2, schedule 2, page 9. Denies all of the material, sheet 3, schedule 2, page 10. Denies all of the material, sheet 4, schedule 2, page 11. Denies all of the material, sheet 5, schedule 2, page 12. Denies all of the material, schedule 4, page 17. Admits defend-

ant's answer 2-A, in parentheses, on page 18, and denies defendant's answer 2-B and 2-C, appearing on page 18, and denies the answer to paragraph 3 appearing on page 18. Accepts the answer to the first sentence of paragraph 4 appearing on page 18.

Denies the answer to paragraph 5 appearing on page 19 and all the material, including the heading reading as follows, and thereafter set forth on that page: "Description of means and methods used in computing schedule 1."

Denies all the material appearing on pages 20, 21, 22, 23, 24, 25, and 26.

Plaintiff rejects Exhibits 13 and 14 referred to in the answer to paragraph 7 appearing on page 29, also rejects the following portion of that answer, (b) model a cam shaft—is attached hereto marked Exhibit 16, and (c) tractor cam shafts—is attached hereto marked Exhibit 17.

Plaintiff also denies and rejects so much of the following sentence as refers to Exhibits 13, 14, 16 and 17: "The operation sheets attached hereto and marked Exhibits 13 to 17 inclusive, are the only operation sheets which could be found after a most exhaustive search through all available records of defendant."

Plaintiff rejects the last sentence of the answer appearing on page 29, commencing with the words: "Exhibit 13," and except as herein qualified and rejected, plaintiff accepts the answer.

Plaintiff accepts defendant's answer to question 8 appearing on page 30. Also the plaintiff accepts the defendant's answer to question 9 appearing on page 30.

Plaintiff also accepts defendant's answer to question 10 appearing on page 31.

(h) THE FOLLOWING PORTIONS OF THE STENOGRAPHER'S TRANSCRIPT OF TESTIMONY DESIGNATED BY BOTH PLAINTIFF AND DEFENDANT.

(Note: P-I, P-II, P-III, etc., and D-I, D-II, etc., in this designation indicate the bound volumes of the Stenographer's Transcript of Testimony as chronologically taken and transcribed on behalf of Plaintiff and Defendant, respectively.)

		Beginning		*Ending*	
Witness	*Volume*	*Line*	*Page*	*Line*	*Page*
Hovis	P-I	6	3	1	7
		10	7	15	9
		10	17	18	18
		3	19	7	19
		23	23	3	24
		24	24	9	25
		10	25	last line	27
		2	30	10	32
		25	34	11	35
		4	37	9	40
		13	41	23	41
		8	43	6	46
		1	48	2	48
		16	49	3	55
		13	55	17	55
		5	56	1	60
		4	60	20	62
Woehrle	P-I	12	67	18	71
		18	80	16	81
		13	98	23	98
		11	105	14	106
		6	111	22	111
		23	111	13	112
		27	112	21	114
Hovis	P-I	10	115	22	116
Woehrle	P-I	23	116	9	118
		10	118	19	120
		6	124	14	125
		26	150	4	153
		1	155	2	156
		26	157	6	160

Witness	Volume	Beginning Line	Beginning Page	Ending Line	Ending Page
		14	162	25	164
		1	166	8	174
		9	174	4	175
		23	184	1	186
		21	186	22	187
		23	187	all	192
Hovis	P-II	5	198	17	198
		15	200	17	201
Woehrle	P-II	10	205	11	205
		1	206	23	210
		7	245	23	245
		16	257	17	257
		18	257	12	259
		18	261	7	262
		7	269	13	272
Scovill	P-II	19	275	22	276
		2	294	19	294
Moise	P-III	5	44	21	47
		1	57	2	59
		1	62	26	62
		20	65	2	66
		3	66	20	67
		14	76	2	81
		7	81	1	88
		14	97	17	100
		12	101	15	101
		15	103	22	105
		21	123	11	125
		13	133	20	133
		12	139	19	141
		19	146	12	147
Gordon	P-III	21	152	17	154
		6	163	17	164
		18	164	26	164
		22	173	last line	173
		1	174	4	177
		5	177	7	177
		1	178	24	180
		1	204	5	205
		7	205	11	205

Witness	Volume	Beginning Line	Beginning Page	Ending Line	Ending Page
		7	207	25	207
		9	209	11	209
		12	210	4	213
		14	214	13	216
		1	217	11	217
		1	218	27	222
Broughton		11	236	1	244
		10	246	17	246
		1	247	5	247
		1	257	2	257
		24	257	4	258
Jones	P-IV	4	261	15	263
		11	273	1	277
		9	277	10	277
		11	277	13	279
		25	279	4	281
		7	281	8	281
		9	281	10	283
		13	283	14	283
		15	283	2	284
Sloniker	P-V	6	289	17	294
		7	297	12	298
		5	300	1	302
		3	302	17	302
		18	310	5	315
		14	318	1	320
		21	320	21	320
		20	343	8	344
Gordon	D-I	17	5	19	7
		22	8	16	11
		9	12	15	12
		19	12	22	13
		7	14	22	14
		1	17	15	19
		20	45	10	48
		17	48	19	89
		16	95	14	147
		10	148	29	151
		1	152	12	165
		27	165	10 (period)	179

		Beginning		Ending	
Witness	*Volume*	*Line*	*Page*	*Line*	*Page*
		26	180	20 (period)	183
		2	184	2	188
		7	188	11	194
		14	194	2	201
Moise		20	202	26	202
		1	228	last line	229
		21	232	4	233
		20	245	6	246
		1	247	11	248
Shawkey		7	269	26	282
Libby		1	283	26	283
		9	284	22	285
		11	286	last line	310
Shawkey		8	311	20	321
		5	322	12	324
		5	335	28	336
Klopsic		6	337	11	356
		3	373	26	376
Myers	D-II	2	431	21	434
		26	479	6	484
Marentette		21	487	12	501
Counsel		16	503	23	503
Wibel		11	522	14	522
		23	551	14	555
		24	556	21	564
		15	565	6	574
		14	577	22	577
		23	577	9	578
Gordon	D-III	1	742	8	744
Dahl		9	744	22	749
		23	755	7	756
		6	758	22	763
		10	764	21	767
		4	768	21	772
Smith		1	773	3	775
Counsel		4	879	last line	880
Aptekar		1st line	881	22	900
		last line	910	17	913
		1	914	15	934

Witness	Volume	Beginning Line	Beginning Page	Ending Line	Ending Page
Hunt		16	934	22	936
		15	949	12	960
Pillinger		14	962	9	966
		3	970	23	973
		23	974	19	976
		25	981	11	995
		15	999	23	1003
		27	1003	16	1006
Schmidt		2	1009	last line	1032
Herklotz	D-IV	6	1034	4	1035
		26	1055	5	1059
		20	1063	19	1065
		9	1068	28	1082
		10	1083	24	1092
		11	1093	last	1093
		22	1096	24	1098
		22	1101	last	1103
Pioch		3	1110	14	1121
				(period)	
		25	1131	16	1132
		15	1138	5	1166
		12	1174	21	1174
		22	1176	23	1177
		2	1179	27	1179
Pioch	D-V	19	1186	22	1188
		3	1189	19	1189
		21	1189	19	1197
		16	1200	3	1201
		11	1202	8	1242
		11	1242	14	1254
		10	1255	24	1266
		13	1270	25	1282
		21	1298	last	1298
		1	1302	2	1302
		6	1303	18	1304
		3	1305	5	1311
		20	1311	8	1312
Boesen		1	1315	2	1343
Counsel		28	1343	24	1350

Witness	Volume	Beginning Line	Beginning Page	Ending Line	Ending Page
Brush	D-VI	14	1356	24	1375
		25	1375	10	1386
		15	1402	8	1404
		21	1406	19	1415
		4	1416	8	1443
		17	1443	19	1443
		23	1443	11	1471
		15	1471	11	1478
Franklin	D-VI	1	1491	6	1523
Achten	D-VI	1	1595	16	1600
		17	1606	21	1618
		8	1619	1	1623
Payne	D-VI	6	1624	27	1625
Hovis		2	1627	8	1627
		17	1627	12	1656
Hogelan		1	1667	14	1668
		20	1670	last	1673
		29	1675	17	1679
Hogelan	D-VII	10	1696	11	1699
Weyl	D-VII	17	1699	13	1706
		last line	1707	1	1714½
		3	1737	last line	1762
		19	1845	9	1852
McEvoy	D-VII	2	1715	23	1715
		16	1717	12	1727
		1	1729	26	1732
		1	1734	18	1735
Aptekar	D-VII	1	1763	15	1777
Farley	D-VII	5	1781	last line	1800
		5	1804	11	1804
		5	1810	10	1811
Michael	D-VII	11	1811	9	1824
		20	1824	6	1825
Scovill	D-VII	7	1826	18	1835
		12	1842	29	1843
Master		1	1844	13	1845
Woehrle	D-VII	21	1854	25	1854
		10	1855	10	1862
		10	1878	12	1892
		7	1895	11	1896

Witness	Volume	Beginning Line	Beginning Page	Ending Line	Ending Page
		17	1899	17	1901
				End Sentence	
		27	1901	last line	1915
		13	1918	14	1918
		15	1918	8	1946
		14	1957	3	1969
		6	1976	22	1979
		19	1980	last	1993
		12	1999	last	2006
Pioch	D-VIII	7	2028	13	2028
		1	2029	10	2030
		14	2031	3	2034
		11	2035	15	2037
		16	2037	23	2042
		19	2044	2	2046
		7	2048	3	2054
		4	2054	25	2055
		7	2056	11	2056
Woehrle		12	2056	last line	2063
		12	2076	26	2087
		14	2089	2	2092
		23	2092	6	2093
		27	2093	7	2095
Russell		14	2102	24	2105
		4	2106	20	2108
		last	2112	9	2114
		15	2115	1	2118
		14	2118	4	2122
		16	2123	1	2126
		22	2131	15	2133
Woehrle		1	2136	25	2137
		4	2141	11	2141
Stipulation		6	2144	14	2145
Oberhoffken	D-IX	9	2147	24	2167
		3	2169	14	2195
Ohrn		7	2196	16	2197
		26	2197	8	2226
Hajovich		9	2226	29	2245
Kipta		1	2246	last	2254
Hunt	D-X	10	2258	26	2276

Witness	Volume	Beginning Line	Beginning Page	Ending Line	Ending Page
Gordon		15	2278	7	2283
		21	2283	8	2288
		last line	2288	5	2301
		7	2378	17	2387
		1	2452	8	2459
Moise		16	2459	22	2463
		19	2471	last line	2472
		21	2478	1	2479
		15	2480	2	2482
		13	2482	24	2489
		11	2494	15	2522
		7	2524	13	2535
		1	2544	17	2556
		4	2565	last	2566
		23	2567	6	2568
		21	2568	28	2568

The following to be printed as an Appendix in the printed transcript of record:

(i) Designated portions of the testimony of the witnesses Otto H. Schultz, Frank Steinke, Bert Weisel, Wm. Cunningham and Charles Gordon from Plaintiff's Exhibit 14.

Schultz:—

Q. 1, page 132, to and including Q. 22 and answer page 136.

Q. 45, page 140, to and including Q. 72 and answer page 145.

Weisel:—

Q. 1, page 190, to and including Q. 55 and answer page 198.

XQ. 84 and answer page 203.

XQ. 100, page 205 to XQ. 102, page 206.

XQ. 115 and answer page 210.

XQ. 116 and answer page 210.

XQ. 121, page 211, to and including RDQ. 150 and answer page 219.

RDQ. 153, page 220, to and including RDQ. 154 and answer page 220.

RDQ. 166, page 222, to and including RDQ. 177 and answer page 224.
RDQ. 183, page 224, to and including RXQ. 193 and answer page 226.
RRDQ. 207 and answer page 229.

Steinke:—

Q. 1, page 230, to and including RDQ. 66 and answer page 238.

Cunningham:—

Q. 1, page 288, to and including Q. 16 and answer page 293.
XQ. 19, page 293, to and including XQ. 43 and answer page 298.
RDQ. 44 and answer page 299.

Gordon:—

Q. 56, page 402, to and including Q. 57 and answer page 403.
Q. 66, page 405, to and including Q. 74 and answer page 409.
XQ. 188, page 441, to and including XQ. 190 and answer page 442.

(j) Master's report in *National Tube Company v. Mark,* Equity No. 4360.

(k) Judge Sater's opinion in *National Tube Co. v. Mark,* Equity No. 4360.

(l) Special Master's report in *Oneal v. San Jose Canning Company,* Equity No. 1307.

(m) The opinion of the Circuit Court of Appeals for the Sixth Circuit in *Gordon Form Lathe Company v. Walcott Machine Company,* No. 5111, decided April 12, 1929, 32 Fed. (2d) 55.

(n) The opinion of the Circuit Court of Appeals for the Sixth Circuit in *Gordon Form Lathe Company v. Ford Motor Company,* Nos. 7363, 7364, decided January 12, 1937, 87 Fed. (2d) 390.

(o) The following exhibits to be reproduced in separately bound Exhibit Volumes:

COMPOSITE DESIGNATION BY PLAINTIFF AND DEFENDANT OF EXHIBITS TO BE REPRODUCED IN EXHIBIT VOLUME.

Exhibit

D
E
E^{1} (Same as Exhibit 6 in Exhibit A)
F
F^{1} to F^{13}
H^{1}
L^{1} to L^{3}
M (Same as Exhibit 13 in Exhibit C)
N (Same as Exhibit 14 in Exhibit C)
O
P^{1} to P^{14}
Q
R
S
W^{1} to W^{14} inc.
X^{1} to X^{3}
Y^{1}
Z^{3} to Z^{7}
CC
DD
KK
LL
RR
209
217 to 222
232
233
237 Phys.
254
255
256 Phys.
257
258
259
263

COMPOSITE DESIGNATION BY PLAINTIFF AND DEFENDANT OF EXHIBITS TO BE REPRODUCED IN EXHIBIT VOLUME.

Exhibit

264
266
268
269
272
273
276
281 (Same as Exhibit 15 in Exhibit C)
289 to 294 inc.
295
296
297
298
299
301
302
304
305
306
307
308
309
312
313
314
315

Main Record Exhibits

Ex. 2
Ex. 5
Ex. 40
Ex. 41
Ex. 42
Ex. 48
Ex. 52
Ex. 53
Ex. 53[b]
Ex. 55
Ex. 56

COMPOSITE DESIGNATION BY PLAINTIFF AND DEFENDANT OF EXHIBITS TO BE REPRODUCED IN EXHIBIT VOLUME.

Ex. 61
Ex. 62
Ex. 63
Ex. 64
Ex. 71
Ex. 154[a], [b], [c], [d]

10. Final Judgment.
11. Plaintiff's Notice of Appeal.
12. Plaintiff's Cost Bond on Appeal.
13. Plaintiff's Statement of Points to be Urged on Appeal.
14. Defendant's Notice of Appeal.
15. Defendant's Cost Bond on Appeal.
16. Defendant's Statement of Points to be Urged on Appeal.
17. Stipulation re: Waiver of Supersedeas Bond.
18. Stipulation dated July 19, 1941, concerning number of copies of record to be filed on appeal.
19. Stipulation dated July 21, 1941, re exhibits and transcript of record on appeal in Gordon v. Ford Nos. 7363-4.
20. Order dated July 23, 1941, re exhibits and transcript of record on appeal in Gordon v. Ford Nos. 7363-4.
21. This designation of contents of record on Appeal.
22. All orders extending times for docketing the Appeal.
23. Clerk's certification.

Respectfully submitted,

LECHER, MICHAEL, WHYTE & SPOHN,
Attorneys for Plaintiff.

Dated: Sept. 5, 1941.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Attorneys for Defendant.

Dated: Sept. 4, 1941.

STIPULATION EXTENDING TIME FOR DOCKETING RECORD ON APPEAL.

(Dated June 3, 1941.)

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties hereto, the Honorable Court consenting, that the time for docketing the record on appeal therein be extended to and including July 29, 1941.

(sgd) GEORGE REX FRYE,
(sgd) SWAN, FRYE & HARDESTY,
1403 Ford Building,
Detroit, Michigan,
Attorneys for Plaintiff.

Dated: June 3, 1941.

(sgd) BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
1400 Buhl Building,
Detroit, Michigan,
Attorneys for Defendant.

Dated: June 3, 1941.

ORDER GRANTING EXTENSION OF TIME FOR DOCKETING RECORD ON APPEAL.

(Entered June 4, 1941 by Arthur J. Tuttle, Judge.)

Upon reading and filing of the stipulation of the parties hereto,

IT IS HEREBY ORDERED that the time for docketing the record on appeal be extended to and including July 29, 1941.

(sgd) ARTHUR J. TUTTLE,
United States District Court.
Judge.

Bay City, Mich.
Dated: June 4, 1941.
(Stipulation and order filed June 5, 1941)

STIPULATION EXTENDING TIME FOR DOCKETING RECORD ON APPEAL AND APPROVAL OF U. S. CIRCUIT COURT OF APPEALS.

(Filed July 21, 1941.)

It appearing that plaintiff herein has filed the Notice of its Appeal on April 30, 1941 and its time ninety (90) days within which to docket its appeal under the provisions of Rule 73 (g) (F. R. C. P.) expires on July 29, 1941; that defendant herein has filed the Notice of its Appeal on July 2, 1941; and that counsel for the parties hereto desire to prepare and print for docketing a single, consolidated transcript of record on appeal under the provisions of Rule 75 (k) (F. R. C. P.), therefore;

It is stipulated by counsel for the parties hereto this Honorable Court consenting that the time within which to print and docket the transcript of record on the appeal taken herein by plaintiff and the time within which to print and docket the transcript on the appeal taken herein by defendant be extended to include September 27, 1941.

RICHEY & WATTS,
B. D. WATTS,
Counsel for Plaintiff.

July 17, 1941.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Counsel for Defendant.

July 18, 1941.

Filed: July 21, 1941.

Approved:

XEN HICKS,
U. S. Circuit Judge.

STIPULATION EXTENDING TIME FOR DOCKETING RECORD ON APPEAL AND APPROVAL OF U. S. CIRCUIT COURT OF APPEALS.

(Filed September 24, 1941.)

It appearing that the time for docketing the respective appeals taken by Plaintiff and Defendant in the above cause, which was extended by the Stipulation approved by this Court on July 21, 1941, will expire on September 27, 1941 and it further appearing that the printer will be unable to complete the printing of the consolidated Transcript of Record on Appeal, therefore;

It is stipulated by counsel for the parties hereto this Honorable Court consenting that the time within which to print and docket the transcript of record on the appeal taken herein by plaintiff and the time within which to print and docket the transcript on the appeal taken herein by defendant be extended to include October 27, 1941.

RICHEY & WATTS,
B. D. WATTS,
Counsel for Plaintiff.

September 19, 1941.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Counsel for Defendant.

September 22, 1941.

Approved:

XEN HICKS,
U. S. Circuit Judge.

A true copy:

Attest:

J. W. MENZIES,
(Seal) *Clerk, U. S. C. C. A., Sixth Cir.*

STIPULATION EXTENDING TIME FOR DOCKETING RECORD ON APPEAL AND APPROVAL OF U. S. CIRCUIT COURT OF APPEALS.

(Filed October 23, 1941.)

It appearing that the time for docketing the respective appeals taken by Plaintiff and Defendant in the above cause, which was extended by the Stipulation approved by this Court and filed September 24, 1941, will expire on October 27, 1941 and it further appearing that the printer will be unable to complete the printing of the consolidated Transcript of Record on Appeal therefore;

It is stipulated by counsel for the parties hereto this Honorable Court consenting that the time within which to print and docket the Transcript of Record on the appeal taken herein by plaintiff and the time within which to print and docket the transcript on the appeal taken herein by defendant be extended to include November 26, 1941.

(signed) RICHEY & WATTS, B. D. WATTS,
Counsel for Plaintiff.

October 20, 1941.

(signed) BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Counsel for Defendant.

October 21, 1941.

Approved:

XEN HICKS,
Circuit Judge.

A true Copy:

Attest: J. W. MENZIES,
(Seal) *Clerk, U. S. C. C. A., Sixth Cir.*

CERTIFICATE OF CLERK.

EASTERN DISTRICT OF MICHIGAN,
SOUTHERN DIVISION, SS.

I, GEORGE M. READ, Clerk of the District Court of the United States, within and for the Eastern District of Michigan, Southern Division, do hereby certify that the foregoing pages contain a full, true and complete copy of the pleadings, testimony, exhibits and other papers filed in this cause, in accordance with the Stipulated Designation of Contents of Plaintiff-Defendant Composite Record on Appeal filed herein.

IN TESTIMONY WHEREOF, I have hereunto signed my name and affixed the seal of said Court at Detroit, in said District, this ..... day of November, 1941.

(Seal) GEORGE M. READ,
Clerk of the United States District Court for the Eastern District of Michigan.